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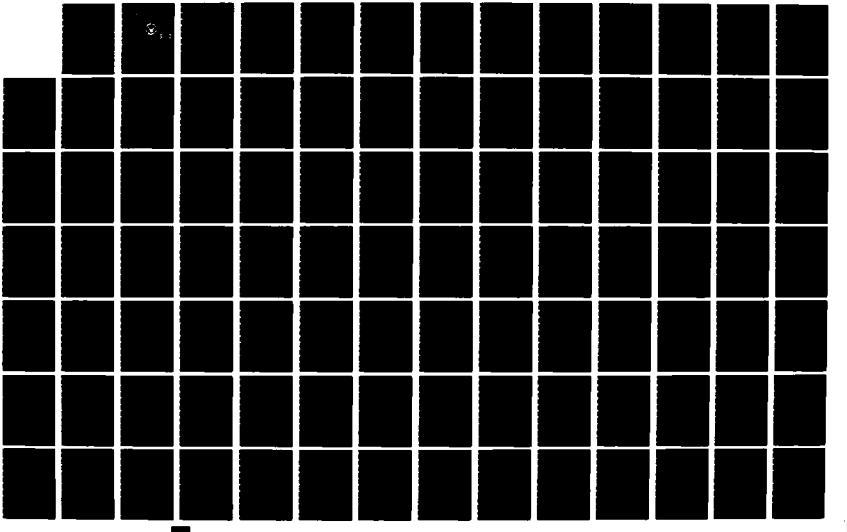

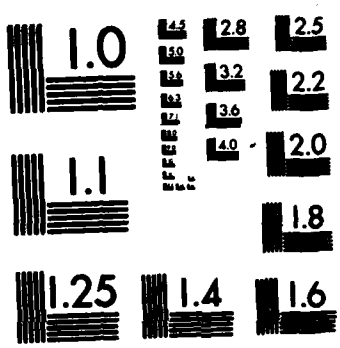

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NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

A SENSITIVITY ANALYSIS OF ENTRY AGE NORMAL MILITARY RETIREMENT COSTS

by

Donald F. Smith, Jr.

September 1983

Thesis Advisors: K. J. Euske
G. Thomas

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The purpose of the study is to develop an interactive computer model of the entry age normal cost models and perform a sensitivity analysis of both the individual and aggregate entry age normal actuarial cost models under differing economic, managerial and legal assumptions. In addition to the above, a set of simple estimating equations under a probable set of managerial and legal assumptions is provided.

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A Sensitivity Analysis of Entry Age Normal Military Retirement Costs

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

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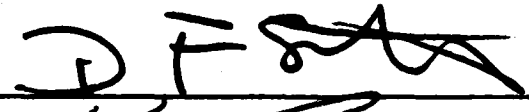
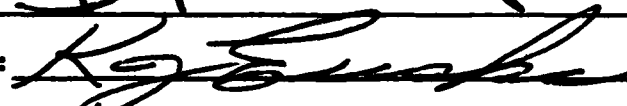
Author: 

Approved by: 
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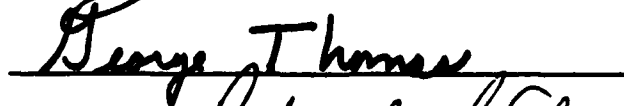
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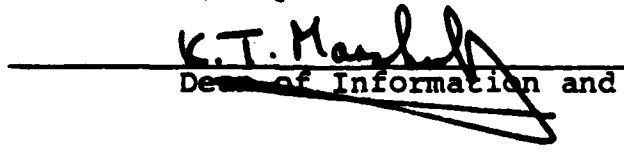
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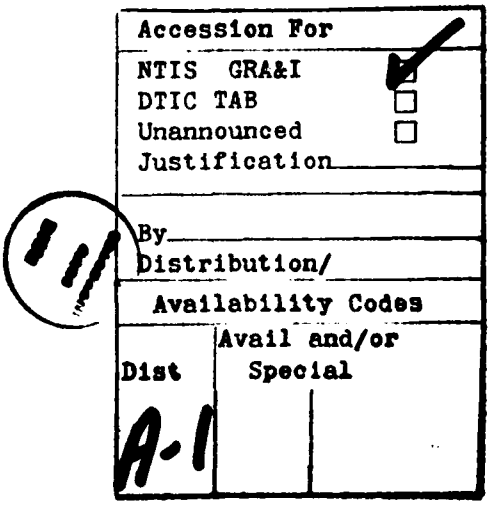
ABSTRACT

The purpose of the study is to develop an interactive computer model of the entry age normal cost models and perform a sensitivity analysis of both the individual and aggregate entry age normal actuarial cost models under differing economic, managerial and legal assumptions. In addition to the above, a set of simple estimating equations under a probable set of managerial and legal assumptions is provided.



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I. BACKGROUND AND INTRODUCTION

A. BACKGROUND

The present non-disability retirement for uniformed members of the Department of Defense is an unfunded, defined benefit plan. The uniformed employee is (subject to approval from the Service Secretary) eligible for voluntary retirement after completion of 20 years active duty service. At the time of retirement, the service member receives an annual pension of 2.5 percent of final base pay for each year of active duty, up to a maximum of 75 percent of base pay for 30 years or more service. Uniformed employees entering military service after 8 September, 1980, must average their final three years base pay to determine their retirement basis. In addition to this direct monetary pension, the retired service member also receives free medical and dental care, as well as use of military exchanges and commissaries. The current annual cost for nondisability retiree annuitants was $13.9 billion in fiscal year 1982. (Department of Defense, 1983)

Currently, there is no formal accounting of the military retirement liability as it accrues during a service member's active duty employment. However, in response to Public Law 95-595, the Department of Defense is required to file an annual valuation of the military retirement system. The

Department of Defense Actuary has chosen the entry age normal cost method as the basis of its valuation (Department of Defense, 1983). This annual valuation constitutes neither the formal accrual of retirement liability nor official adoption of the entry age normal method by the military in the event actual accrual of retirement benefits were to be directed by Congress. Waterman (1983), investigated several actuarial methods for evaluating the military retirement liability and concurred in the adoption of the entry age normal method for estimating the cost of retirement benefits. Furthermore, he considered either the individual or aggregate methods of the entry age normal actuarial technique to be acceptable.

Given the academic and professional consensus that entry age normal actuarial methods are most appropriate to the particular needs of the Department of Defense in accounting for retirement costs, an analysis of the sensitivity of both the individual entry age normal and aggregate entry age normal methods to varying economic conditions is appropriate. This study is a sensitivity analysis, using actual historic Department of the Navy information, examining the range of results which occur with entry age normal actuarial calculations when selected input variables are varied to reflect differing economic assumptions. For example, current manpower costs and personnel statistics are combined with projected rates of military salary increases ranging from 2.5 to 7.5 percent to determine the effect of expected future pay

increases upon expected retirement costs. In addition to the sensitivity analysis, estimating equations under a probable set of managerial/legal assumptions are derived through regression analysis of the input/output relationships. Changing values of non-monetary retirement benefits are not addressed in this study.

B. INTRODUCTION TO ENTRY AGE NORMAL

The entry age normal methods of retirement costing are the most frequently used actuarial techniques in both the public and private sectors. The entry age normal technique attempts to levy a constant amount or percentage of regularly earned pay against each year's employment. Differences between actuarial assumptions and actual outcomes can cause gains and losses to the fund, and therefore impact the flat rate assessment. This flat rate assessment, called the normal cost, is adjusted by the value of these minor gains and losses by amortizing them over the remaining working life of the participants. (Dreher, 1967)

The following subsections briefly address both the individual entry age normal and aggregate entry age normal mathmatical computational models. Tables (I through VI) of entry age normal input/output variables and equations adopt the same variable assignments as Waterman (1983). An indepth discussion of these variables and equation derivations can be found in that study.

1. Individual Entry Age Normal Calculations

General individual entry age normal calculations use the variables listed in Table I. Variables marked by an asterisk (*) in Table I and Table III are considered to be prime exogenous variables. They are important because of their potential impact upon retirement costs and are used in the sensitivity analysis. The unmarked variables in Table I and Table III are functions of the exogenous variables.

TABLE 1

GENERAL INDIVIDUAL ENTRY AGE NORMAL VARIABLES

Description	Variable
Annual Retired Annuity	A
Actuarial Normal Cost	AC
*Annual Discount Rate	i
Current Year Gains/Losses	F
Current Year Applied Gains/Losses	Fa
Deferred Gains/Losses	Fd
*Life Expectancy at Retirement	L
Number of Contribution Years	n
Annual Normal Cost	NC
Present Value of Retirement Benefits	P
Current Year's Retirement Cost	RC
Remaining Working-Life of Employee	RWL

The general individual entry age normal variables listed in Table I are applied to the following equations in Table II, which are used in all entry age computations. (Waterman, 1983)

TABLE II

GENERAL INDIVIDUAL ENTRY AGE NORMAL EQUATIONS

$$P = A \times \frac{1}{1 - \frac{(1 + i)^{L}}{i}}$$

$$NC = P \times \frac{i}{(1 - i)^{n} - 1}$$

$$F = NC - AC$$

$$Fa = (F - Fd) \times \frac{i}{1 - \frac{1}{(1 - i)^{RWL}}}$$

$$RC = NC + Fa$$

In addition to the above general form age entry normal variables and equations, the following military retirement specific variables shown in Table II, are required input/outputs in the valuation of military retirement.

TABLE III

MILITARY INDIVIDUAL ENTRY AGE NORMAL VARIABLES

Description	Variable
Final Monthly Base Pay	BP
Current Base Pay at Retirement Grade	PBc
Paygrade of Retiree	G
Number of Entrants for a Given Year	I
*Length of Service at Retirement	LOS
Expected Number of Retirees	N
*Probability of an Entrant Retiring at a Given Paygrade, G	Pr(G)
*Probability of an Entrant Reaching Retirement, R	Pr(R)
*Retirement Percentage Rate	RR
*Retirement Percentage Ceiling	RT
*Estimated Rate of Salary Increase	S
Current Total Retirement Cost	TRC

The specific variables listed in Table III (and several of the general variables in Table I) apply to the

specific military retirement calculations in Table IV. (Waterman, 1983)

TABLE IV

MILITARY INDIVIDUAL ENTRY AGE NORMAL EQUATIONS

BP = BPc compounded at rate S over time RWL

A(G,LOS) = min RR x LOS, RT x BP x 12

N = I x Pr(R) x Pr(G)

TRC = RC x N

2. Aggregate Entry Age Normal Calculations

Aggregate entry age normal calculations use the following variables listed in Table V. As in the previous section, variables marked by an asterisk (*) are considered to be important exogenous variables and are used in the sensitivity analysis.

TABLE V

AGGREGATE ENTRY AGE NORMAL VARIABLES

Description	Variable
Actuarial Normal Cost	AC
Current Year Gain/Losses	F
Current Year Applied Gains/Losses	Fd
Annual Discount Rate	i
Normal Cost	NC
*Present Value of Future Benefits	PBe
*Present Value of Future Compensation	PCe
Normal Cost Percentage Factor	PF
Total Base Pay for Current Year	TBF
Current Total Retirement Cost	TRC

The aggregate entry age normal variable listed above in Table V are applied to the equations listed below in Table VI.

TABLE VI

AGGREGATE ENTRY AGE NORMAL EQUATIONS

$$PF = \frac{PBe}{PCe}$$

$$NC = PF \times TBP$$

$$F = NC - AC$$

$$Fa = (F + Fd) \times \frac{\frac{1}{1}}{1 - \frac{1}{(1 + i)^{20}}}$$

$$TRC = NC + Fa$$

II. VALUATION OF ENTRY AGE NORMAL CALCULATIONS UNDER CHANGING ECONOMIC AND MANAGERIAL CRITERIA

A. COMPUTER MODEL

A computer model using the entry age normal variables and equations cited in Chapter I was developed to facilitate the repetitive calculations required for sensitivity analysis. This computer model, named "Entryage", is an interactive computer program written in the BASIC computer programming language. The program is user friendly and once loaded requires minimal computer expertise for operation. All internal program data has been derived from Department of Defense sources and uses 1983 as the "current" year. A printout of Entryage, along with user directions and updating instructions, is found in Appendix A of this study.

Processing was performed on the Naval Postgraduate School's IBM 3033 computer. Entryage output was analyzed by the copyrighted "Minitab" statistical computing system (University of Pennsylvania, 1981). Minitab analysis was also performed on the IBM 3033.

B. INDIVIDUAL ENTRY AGE NORMAL SENSITIVITY ANALYSIS

This section addresses the individual entry age exogenous variable assumptions, baseline value, and sensitivity methodology. Eight exogenous variables are analyzed for input/output relationships.

1. Exogenous Variable Assumptions and Baseline Value

a. Exogenous Variables

A sensitivity analysis is a study of output variation resulting from changes in the value of input variables. An orderly analysis of a multiple input system must select reasonable initial values for each of the input variables. These input variables are then individually varied over feasible ranges while holding all other inputs constant. When the selected initial values are used for all input variables, the output value of the model is known as the baseline value. The baseline value is the result of multiple decisions regarding initial input variable values. The cumulative effect of minor differences in these input variables may have a major impact upon the baseline value.

Eight exogenous input variables are applicable to individual entry age normal calculations for military retirement and are shown in Table VII. These exogenous variables may be divided into two types: those that are essentially uncontrollable by the Department of Defense (e.g. the government discount rate) and those that are controllable (e.g. the probability that a new service entrant will be retained until retirement eligibility). Table VII lists these exogenous variables as to their controllability vice uncontrollability and the abbreviations used to identify the variables in the simulation.

TABLE VII

EXOGENOUS INDIVIDUAL ENTRY AGE NORMAL VARIABLES

Description	Abbreviation	Type
Annual Discount Rate	DIS%	Uncontrollable
Estimated Rate of Salary Increase	SAL%	Uncontrollable
Length of Service at Reitrement	LOSD	Controllable
Length of Service Required to Retire	MLOS	Controllable
Life Expectancy at Retirement	LEXPD	Uncontrollable
Entrant Retirement Probability	ERPD	Controllable
Percent of Base Pay at Retirement	PAY%	Uncontrollable
Maximum Allowed Percent of Base Pay	MAX%	Uncontrollable

The "controllability" of a variable is dependent upon the managerial level which can influence it. For instance, the annual discount rate (DIS%), is relatively uncontrollable at all levels throughout the government because its value is determined by the external market forces which affect not only the cost of government borrowing but also the cost of private debt. The estimated rate of salary increase (SAL%), is tied to both the projected inflation rate and Congressional perception of military retention. The length of service at retirement (LOSD), and length of service required to retire (MLOS), can be controlled by stretching time-in-service requirements for advancements and by adjusting the current acceptable time-in-service for retirement (currently 20 years), up to the legal maximum of 30 years with no Congressional action. Life expectancy at retirement (LEXPD), is a function of multiple environmental effects. The entrant retirement probability is controllable by the military services by adjusting advancement opportunities and reduction-in-force actions. Both the percent of base pay at retirement

(PAY%), and the maximum allowed percent of base pay (MAX%), are legislated by the Congress and therefore though controllable at a higher level, uncontrollable by the Department of Defense.

b. Baseline Configuration

The initial input values selected to establish the baseline are those used by the Defense Actuary in the FY 82 Valuation of Military Pay, with the single exception of the recommended discount rate. (Department of Defense, 1982) The Department of Defense Actuary recommends a rate of 6 percent which is approximately the average yield on long term U.S. securities for the period 1960 through 1978. However, for purposes of this analysis the 6 percent rate was felt to be an excessively conservative figure and would result in the overstatement of current retirement costs. (Note that the lower the discount rate, the larger the value of funds required to meet probable retirement obligations, since the entry age model assumes reinvestment at the discount rate.) After review of recent trends in long term U.S. government securities, a discount rate of 9 percent was selected because the average interest rate has been 9.09 percent for 20 year U.S. government treasury securities for the period 1973 to present (Department of Commerce, 1982). The 9 percent value also compares more favorably with the interest rates promulgated by the Department of the Treasury pursuant to Public Law 92-41. This is the interest rate used by government

estimators when performing cost calculations which require a government cost of money. It is currently (fall 1983), 11.5 percent. This figure is actually a complex average of both government and low risk private securities with 5 year maturities. Since it is a medium term number, the 9 percent long term number was considered a better estimator.

c. Baseline Value

Table VIII lists the input variable values and their resulting total retirement costs (TRC), (in millions of dollars) when calculated by the Entryage model, for both the Selected Baseline and Department of Defense variable configurations. The input values for those variables ending in "%" are the percentages used in computation (e.g. a SAL% of 5.5 percent means a salary increase rate of 5.5 percent was used in computation). Input values ending in "D" are the incremental difference between the Department of Defense Actuary's specific estimates and the amounts used in computation (e.g. an LEXPD of +1 means the actuarially computed life expectancies at retirement were all extended by one (1) year). The incremental difference values for these actuarially computed variables are listed since the model uses each paygrade's individual actuarial data (e.g. the life expectancy of a retiring 44 year old E8 is 30.24 years vice 33.54 for a 44 year old 05) to provide greater accuracy. The length of service required to retire (MLOS), is shown at its absolute input value and is neither a percentage nor delta.

The manpower figures used in the calculations include only regular Navy (USN), enlisted and officer personnel for the years 1953 through 1982. The calculated TRC includes neither disability nor survivor benefits, which are not retirement costs in the strict sense, but the result of military self-insurance and therefore not included in the individual entry age normal computations.

TABLE VIII

ALTERNATIVE CONFIGURATIONS

Variable	Selected Baseline	DOD Actuary
DIS%	9%	6%
SAL%	5.5%	5.5%
LOSD	0	0
MLOS	20 yrs	20 yrs
LEXPD	0	0
ERPD	0	0
PAY%	2.5%	2.5%
MAX%	75%	75%
TRC	$1,210 M	$2,470 M

Table VIII may be interpreted as follows for the selected baseline: If one assumes a discount rate of 9 percent, salary growth of 5.5 percent, a minimum of 20 years of active service for retirement with retirement pay equal to 2.5 percent of the retirement basis per year served and a maximum rate of retirement pay not exceeding 75 percent of the basis, and retention and longevity statistics as computed by the Department of Defense Actuary, the amount of money which should be accrued in 1983 to cover year groups 1953 through 1982 regular Navy personnel (excluding disability and survivor benefits) is $1,210 million. Appendix B

includes yearly breakdowns of Total Retirement Costs for the selected baseline and Department of Defense Actuary assumptions. Appendix C is a detailed display by paygrade by year of both normal costs and total retirement costs for the selected baseline.

2. Sensitivity Methodology

The sensitivity analysis of the individual entryage exogenous variables involved first determining a feasible ranging of the input variable to be investigated. The magnitude of the variable ranging was based upon past values of the variable, possible future economic trends, or changes in managerial and legal decisions. For example, the discount rate (the government borrowing rate) was explored for values of 5 percent to 15 percent. This range encompasses the historical performance of the 1960's (5 percent) and the possible interest rates of a high inflationary period like the early 1980's (15 percent). The variable ranging was then divided into increments and these incremental values were then processed through the Entryage computer model. The increments were chosen on the basis of being small enough to capture likely deviations, but yet large enough to minimize excessive iterations. The resulting output was then graphically analyzed to determine if any predictable relationship appeared to exist between the value of the input variable and the output value. Two types of output were investigated. The first type of output was the annual retirement costs for years

of service entry 1982 (a "close" year) and 1963 (a "far" year) to discern the effect of changes in the input variable upon not only new entrant's retirement costs but also personnel on active duty eligible for retirement.

After graphical analysis, the total retirement cost data was subjected to further review in the "MINITAB" statistical computer model. Using least squares regression, functional relationships between the independent input values and the dependent total retirement costs were explored in the following sequence: linear, logarithmic, and parabolic. A coefficient of determination (R^2), of .95 was established as indicating an acceptable predictive relationship, within the bounds of the input variable range. Using the simulation in this manner produces a set of simplified output relationships. Formal analytical methods could also be used to achieve the same end. In seven out of the eight exogenous variable investigations, a relationship meeting the R^2 criteria was found.

3. Discount Rate Sensitivity

The discount rate (DIS%) was examined over a range of 5 percent through 15 percent in 1 percent increments. Table IX lists the discount rate value (DIS%), the 1963 annual retirement cost (1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC) for the selected range. The baseline configuration with a TRC of $1,120M is the DIS% value of 9 percent.

TABLE IX

DISCOUNT RATE EFFECTS

DIS%	1963	1982	TRC
5%	$90.2M	$168 M	$3,160 M
6	70.4	131	2.470
7	55.3	103	1,990
8	43.6	81.2	1,530
9	34.5	64.4	1,210
10	27.5	51.2	965
11	21.9	41.0	771
12	17.6	32.9	619
13	14.1	26.5	499
14	11.4	21.4	403
15	9.2	17.3	327

Figure 1 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing discount rates. It can be seen that this is an inverse relationship with a more pronounced effect upon close year groups than far year groups. 1963 annual retirement cost varied by $81M over the selected range, while 1982 annual retirement cost varied by $151M over the selected range. Both data sets appear to present a smooth curve over the range of discount rates.

Figure 1

1963(A) and 1982(B) Year Group Retirement Costs

vs

Discount Rate

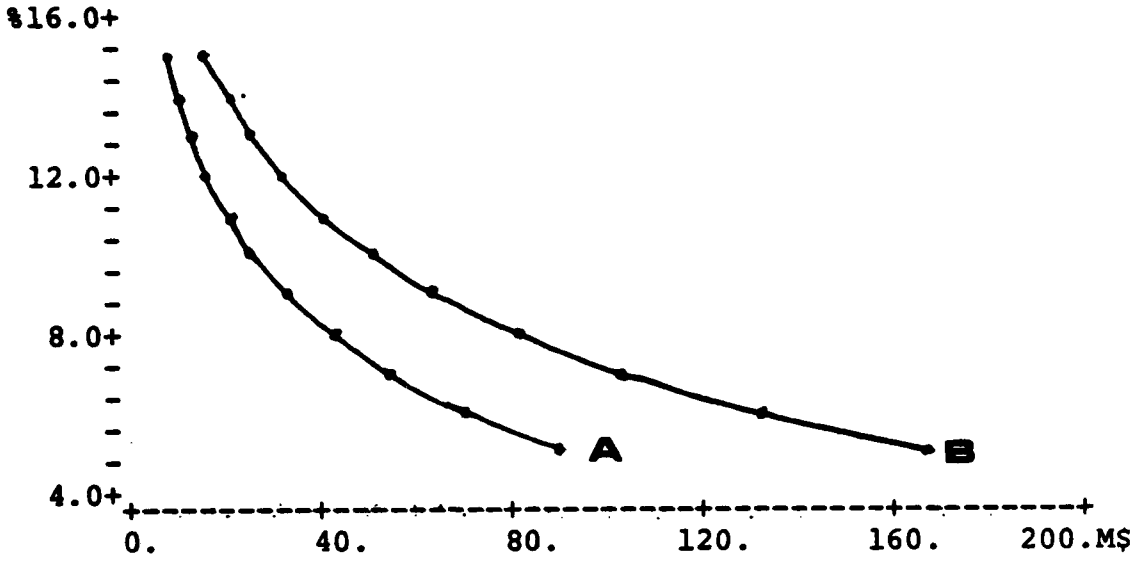


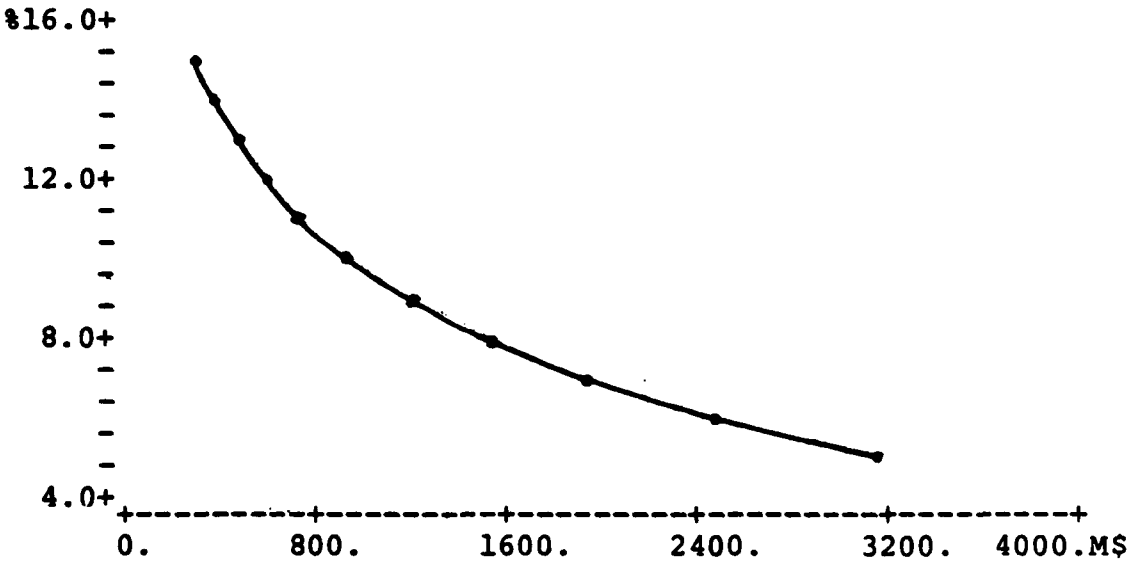
Figure 2 is a graph of total retirement costs for years 1953 through 1982 plotted against the changing discount rates. The graph in Figure 2 displays the same inverse relationship found in Figure 1 and presents a smooth curve. When the input/output relationships were examined to determine the function which gave the highest coefficient of determination; an R^2 of 99.9 (with a standard deviation of .01953) resulted from the logarithmic function ln TRC = \$9.15M - (\$.226M x DIS%).

Figure 2

Total Retirement Cost

vs

Discount Rate



Appendix D is a listing of the annual retirement costs for all years 1953 through 1982 for each of the discount rates.

4. Salary Increase Sensitivity

The salary increase rate (SAL%) was examined over a range of average annual increase from 2.5 percent through 7.5

percent in .5 percent increments. Table X lists the salary increase rate value (SAL%), the 1963 annual retirement cost (1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC) for the selected range. The baseline configuration with a TRC of $1,210M is the SAL% value of 5.5 percent.

TABLE X

SALARY INCREASE EFFECTS

SAL%	1963	1982	TRC
2.5%	$31.4M	$35.0M	$ 866 M
3.0	31.9	38.7	915
3.5	32.4	43.0	966
4.0	32.9	47.5	1,020
4.5	33.4	52.6	1,080
5.0	34.0	58.2	1,140
5.5	34.5	64.4	1,210
6.0	35.1	71.2	1,280
6.5	35.6	78.7	1,360
7.0	36.2	87.0	1,450
7.5	36.8	96.1	1,540

Figure 3 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing average annual salary increase rates. It appears that this is a positive relationship with a more pronounced effect upon close year groups than far year groups. 1963 annual retirement cost varied by only $5.4M over the selected range, while 1982 annual retirement cost varied by $61M over the selected range. This is a predictable response since the salary increases have a longer period of time to effect the close vice far year groups. Both data sets appear to

present a linear relationship over the range of average salary increases.

Figure 3

1963(A) and 1982(B) Year Group Retirement Costs

vs

Salary Increase

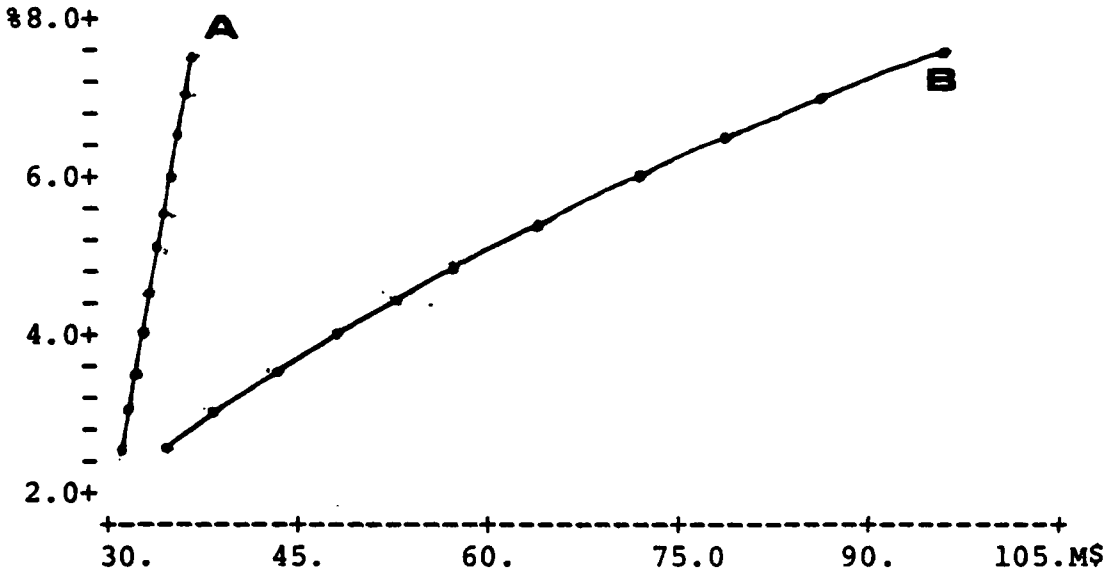


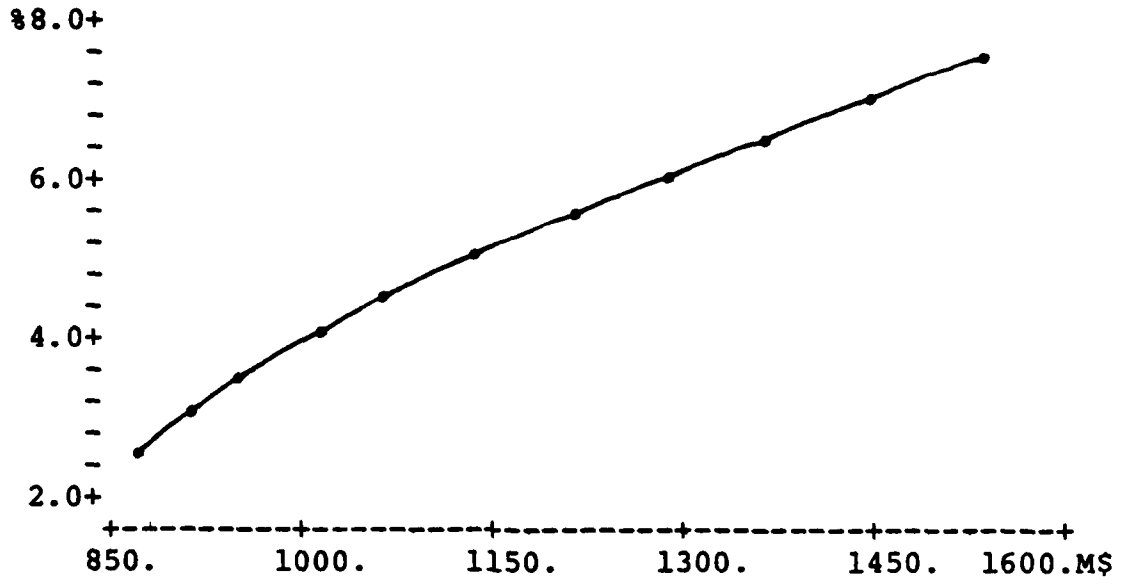
Figure 4 is a graph of total retirement costs for years 1953 through 1982 plotted against the changing average annual salary increase rates. It can be seen that it displays a positive relationship similar to Figure 3. The slope of the curve is intermediate between that of the close and far years. An R^2 of 99.1 (with a standard deviation of 22.49) was calculated from the linear function TRC = \$501.3M + (\$133.3M x SAL%).

Figure 4

Total Retirement Cost

vs

Salary Increase



Appendix E is a listing of the annual retirement costs for all years 1953 through 1982 for each of the salary increases.

5. Length of Service at Retirement Sensitivity

The sensitivity analysis of the length of service at retirement variable (LOSD) was performed in accordance with the sensitivity methodology. However, this was an incremental ranging vice a total value ranging as were the two previous cases. In the two previous cases the variable values represented the actual variable input value into the Entryage model. In this case, the variable value represents the value of the adjustment to the Department of Defense Actuary's estimates. The average length of service at retirement for each pay grade was examined over a range of 3 years less than

the current average to 3 years more than the current average, in 1 year increments. An important feture of the length of service at retirement computation is that if the input of a negative LOSD would reduce a pay grade's average length of service to less than the minimum required for retirement (currently 20 years), the input is disallowed, and the length of service is reduced only to the minimum required for retirement. A corresponding approach has been taken to the problem of age at retirement. The model will not allow any retirement at less than age 37, since the minimum acceptable age for entry into the armed forces is 17 years and 20 years of service are required to retire (17 + 20 = 37). Table XI lists the value of the adjustment to the average length of service at retirement (LOSD), the 1963 annual retirement cost (1963), the 1983 annual retirement cost (1982), and the total retirement cost (TRC) for the selected range. The baseline configuration with a TRC of $1,120M is the LOSD value of 0 (meaning no adjustment to the average length of service at retirement).

TABLE XI

LENGTH OF SERVICE EFFECTS

LOSD	1963	1982	TRC
-3yrs	$34.9M	$65.2M	$1,160M
-2	35.2	65.7	1,190
-1	34.7	64.6	1,190
0	34.5	64.4	1,210
+1	34.7	64.7	1,250
+2	34.5	64.4	1,270
+3	33.9	63.4	1,270

Figure 5 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing average length of service at retirement adjustments. The 1963 annual retirement cost varies by only $1M over the entire range and the 1982 retirement cost varies by only $2.3M over the range. It appears that the potential for increased cost caused by an increase in the percentage of base pay which is awarded to a retiree in an increased length of service environment is largely offset by the decreased life expectancy of the late retirement.

Figure 5

1963(A) and 1982(B) Year Group Retirement Costs

vs

Length of Service

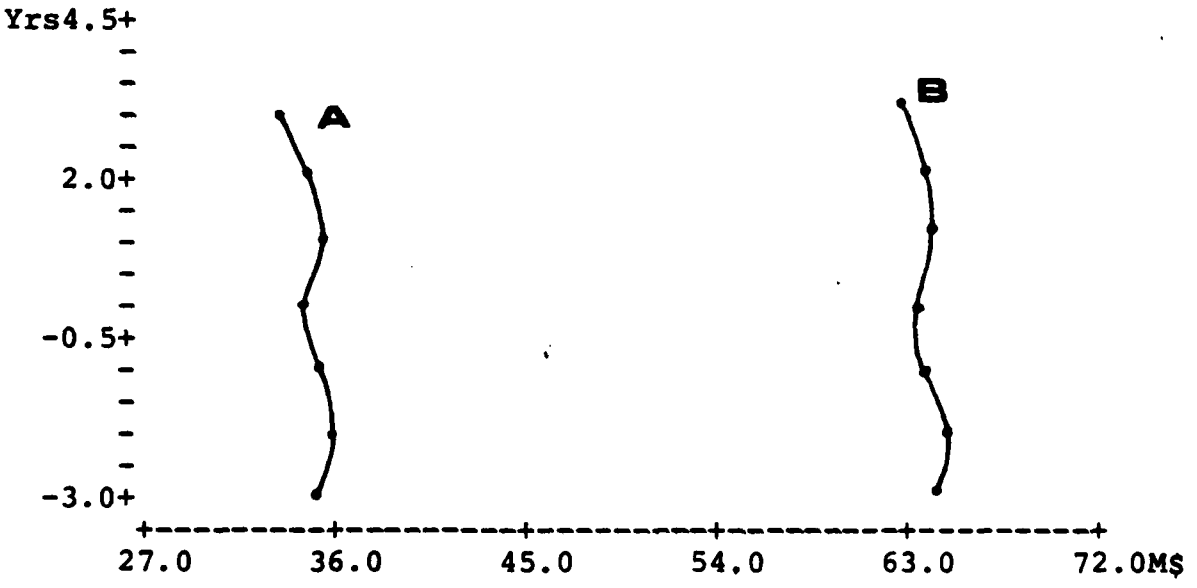


Figure 6 is a graph of the total retirement costs of years 1953 through 1982 plotted against the changing average length of service at retirement adjustments. The graph of

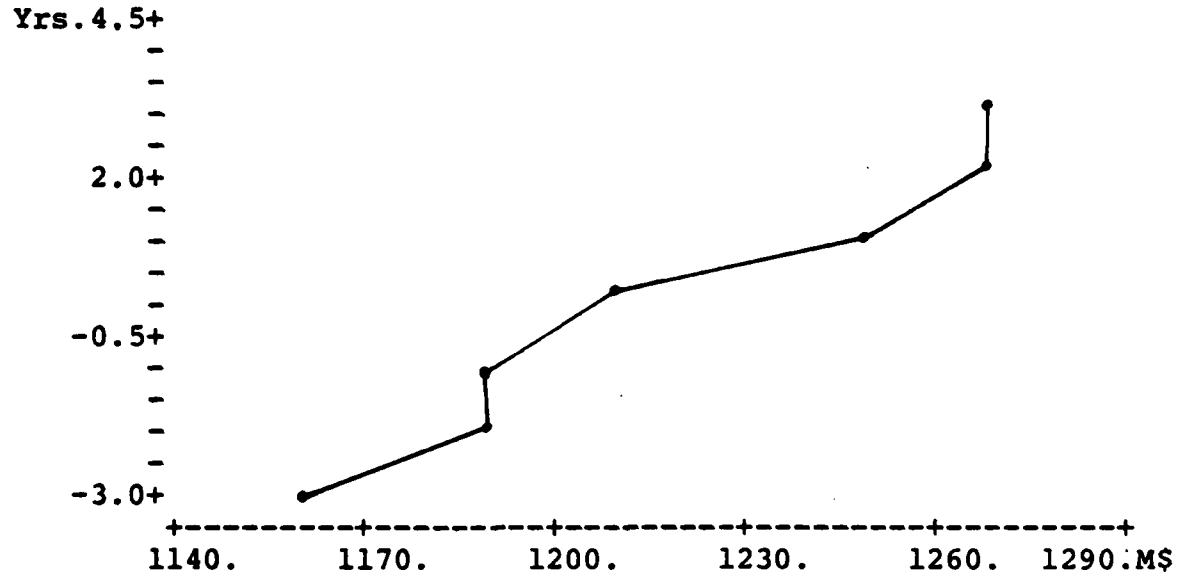
the input/output relationship tends in a positive direction. Total retirement costs varied by only $110M over the entire -3 to +3 range of average length of service adjustments. An increased liability of only $60M was incurred when the average length of service was increased by 2 years, and a further increase to 3 years resulted in virtually no increase in total retirement cost beyond that of the 2 year extension. An R^2 of 95.2 (with a standard deviation of 10.52) was calculated from the linear function TRC = $1219M + ($19.7M x LOSD).

Figure 6

Total Retirement Cost

vs

Length of Service



Appendix F is a listing of the annual retirement costs for all years 1953 through 1982 for each of the average length of service adjustments.

6. Life Expectancy at Retirement Sensitivity

Sensitivity analysis of the life expectancy at retirement was an incremental analysis done in a manner similar to the length of service at retirement analysis. However, only increases to life expectancy were analyzed, since in the United States, life expectancies have shown a strong tendency to increase. Appendix G, Mortality Tables, is taken from the 1982 Life Insurance Fact Book and illustrates this trend toward increased life expectancies. Therefore, life expectancy at retirement adjustments (LEXPD) ranging from increases of 0 to 5 years were explored. Table XII lists the value of the adjustment to life expectancy at retirement (LEXPD), the 1963 annual retirement cost (1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC) for the selected range. The baseline configuration with a TRC of $1,120M is the LEXPD value of 0 (meaning no adjustment to life expectancy at retirement).

TABLE XII

LIFE EXPECTANCY EFFECTS

LEXPD	1963	1982	TRC
0yrs	$34.5M	$64.4M	$1,210 M
+1	34.7	64.7	1,210
+2	34.9	65.0	1,230
+3	35.0	65.3	1,230
+4	35.2	65.6	1,240
+5	35.3	65.9	1,240

Figure 7 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the increasing life expectancy at retirement. Both sets of data show linear

increases in annual retirement costs. 1963 increased by $.8M and 1982 increases by $1.5M for the selected range. The minor increase in annual retirement cost was anticipated since the annuity lengths supported by the life expectancy average approximately 32 years. At that distance from initial funding, adjustments to the annuity lengths do not require equal increases in funding value.

Figure 7

1963(A) and 1982(B) Year Group Retirement Costs

vs

Life Expectancy

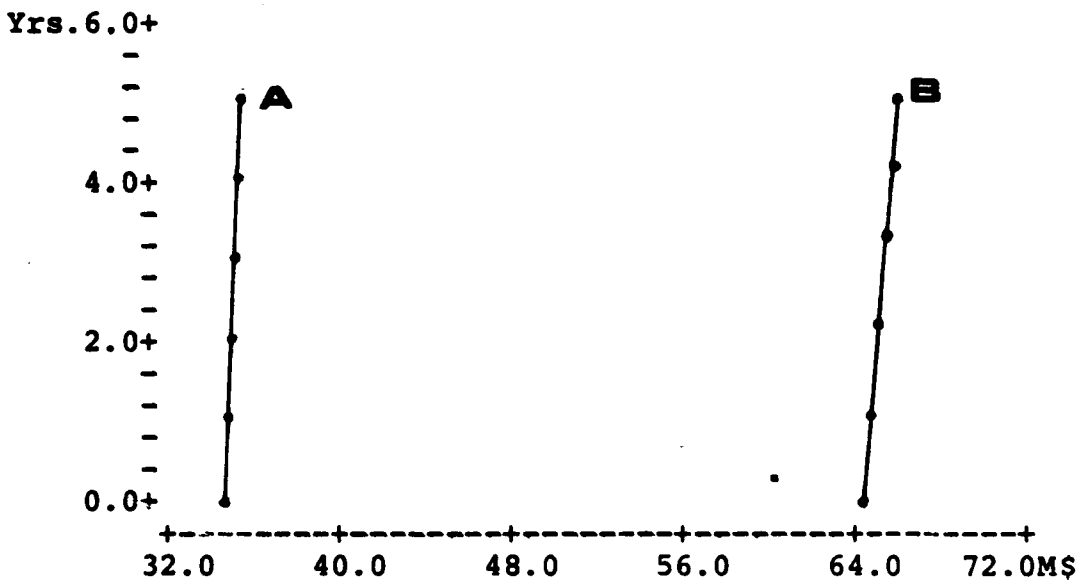


Figure 8 is a graph of the total retirement costs of years 1953 through 1982 plotted against increasing life expectancy at retirement. The input/output relationship is linear, with a variance of only $30M over the entire range of life expectancy adjustments. An R^2 of 99.4 (with a standard

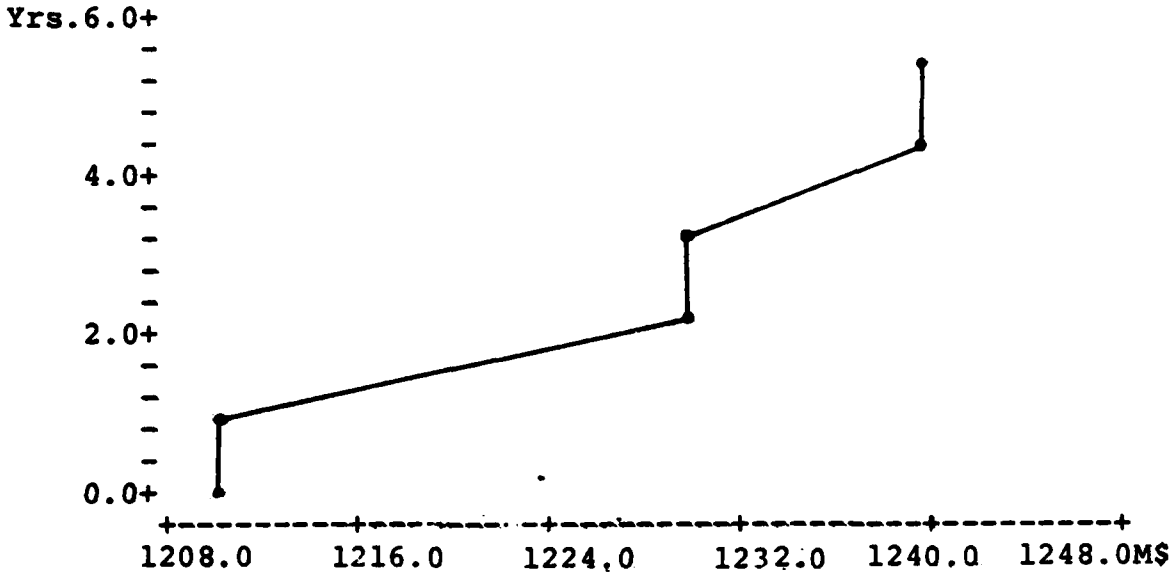
deviation of .9303) was calculated from the linear function TRC = $1214M + ($5.54M x LEXPD).

Figure 8

Total Retirement Cost

vs

Life Expectancy



Appendix H is a listing of the annual retirement costs for all years 1953 through 1982 for each of the life expectancy adjustments.

7. Entrant Retirement Probability Sensitivity

Sensitivity analysis of the entrant retirement probability was an incremental analysis done in a manner similar to the length of service at retirement analysis. In this case, the adjustments are increments of change in probability. Entrant retirement probability (ERPD) adjustments of .03 less than the current average probability to .03 more than

the current average probability were examined in .01 increments. Table XIII lists the value of the adjustment to entrant retirement probability (ERPD), the 1963 annual retirement cost (1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC) for the selected range. The baseline configuaration with a TRC of $1,120M is the ERPD of 0 (meaning no adjustment to entrant retirement probability).

TABLE XII

RETIREMENT PROBABILITY EFFECTS

ERPD	1963	1982	TRC
-.03	$28.7M	$53.2M	$ 997 M
-.02	30.6	56.9	1,070
-.01	32.6	60.6	1,140
0	34.5	64.4	1,210
+.01	36.5	68.1	1,280
+.02	38.4	71.8	1,360
+.03	40.3	75.6	1,430

Figure 9 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing entrant retirement probability adjustments. Both sets of data are linear, with a more pronounced effect upon close year groups than far year groups. 1963 costs varied by $11.6M from $28.7M to $40.3M and 1982 costs varied by $22.4M from $53.2M to $75.6M. It appears as though the model is highly sensitive to small changes in retirement rates.

Figure 9

1963(A) and 1982(B) Year Group Retirement Costs

vs

Retirement Probability

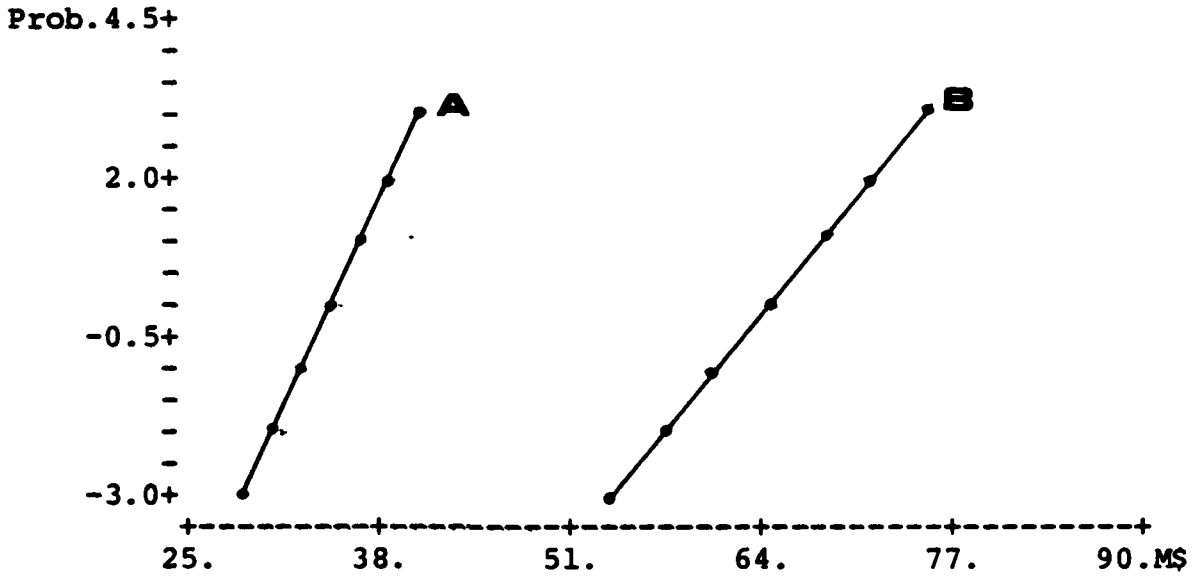


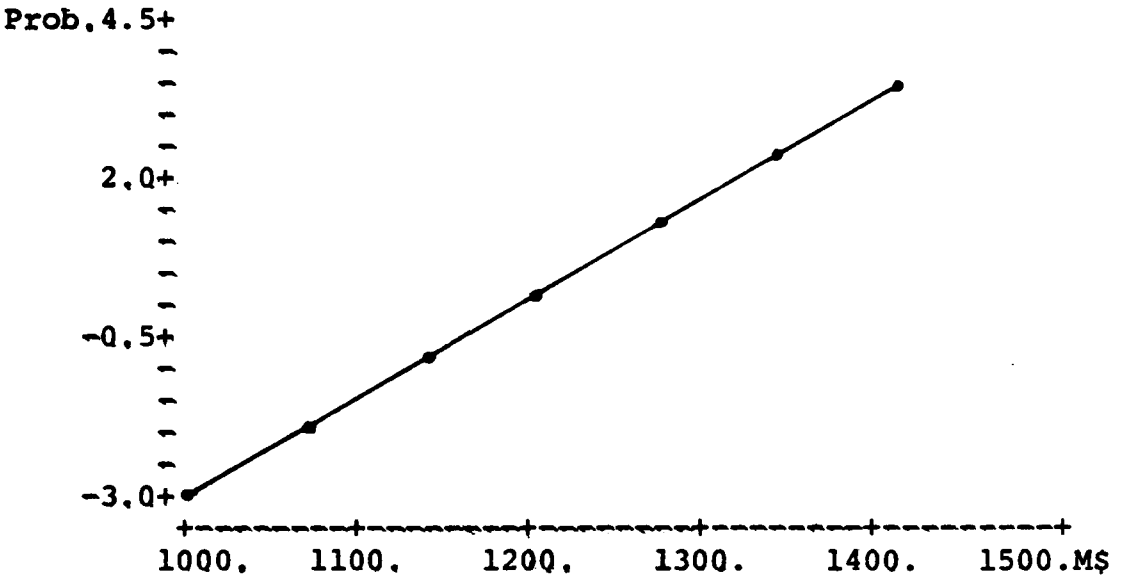
Figure 10 is a graph of the total retirement costs of years 1953 through 1982 plotted against the changing entrant retirement probability adjustments. As in the previous Figure, the data appears to be linear, and when the input/output relationships are examined, the linear function TRC = \$1212M + (\$71.7M x ERPD) provides an R^2 of 99.9 with a standard deviation of .06554.

Figure 10

Total Retirement Cost

vs

Retirement Probability



Appendix I is a listing of the annual retirement costs for all years 1953 through 1982 for each of the entrant retirement probability adjustments.

8. Percent of Base Pay at Retirement Sensitivity

Sensitivity analysis of the percent of base pay to which the member is entitled to receive per year of active duty was conducted in the same manner as the discount rate analysis (i.e. various total value inputs were considered vice incremental adjustments). The percent of base pay (PAY%), is currently set at 2.5 percent per year of active duty completed, with a minimum of 20 years duty required for retirement. The total retirement amount cannot exceed 75 percent of the final active duty base pay. The percent of

base pay (PAY%) was examined over a range of 2 percent through 2.5 percent in .125 percent increments. Table XIII lists the percent of base pay value (PAY%), the 1963 annual retirement cost (1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC) for the selected range. The baseline configuration with a TRC of $1,210M is the PAY% value of 2.5 percent.

TABLE XIII

PERCENT OF BASE PAY EFFECTS

PAY%	1963	1982	TRC
2.000%	$27.6M	$51.5M	$ 970 M
2.125	29.3	54.7	1,030
2.250	31.1	57.9	1,090
2.375	32.8	61.3	1,150
2.500	34.5	64.4	1,210

Figure 11 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing percent of base pay. Both years display a positive relationship to changes in the percent of base pay. 1963 varies $6.9M over the selected range, and 1982 varies $12.8M over the selected range. In both years there is a clear relationship between reductions in percent of base pay and resulting annual retirement costs: a given percentage reduction in the first results in an equal percentage reduction in the latter.

Figure 11

1963(A) and 1982(B) Year Group Retirement Costs

vs

Percent of Base Pay

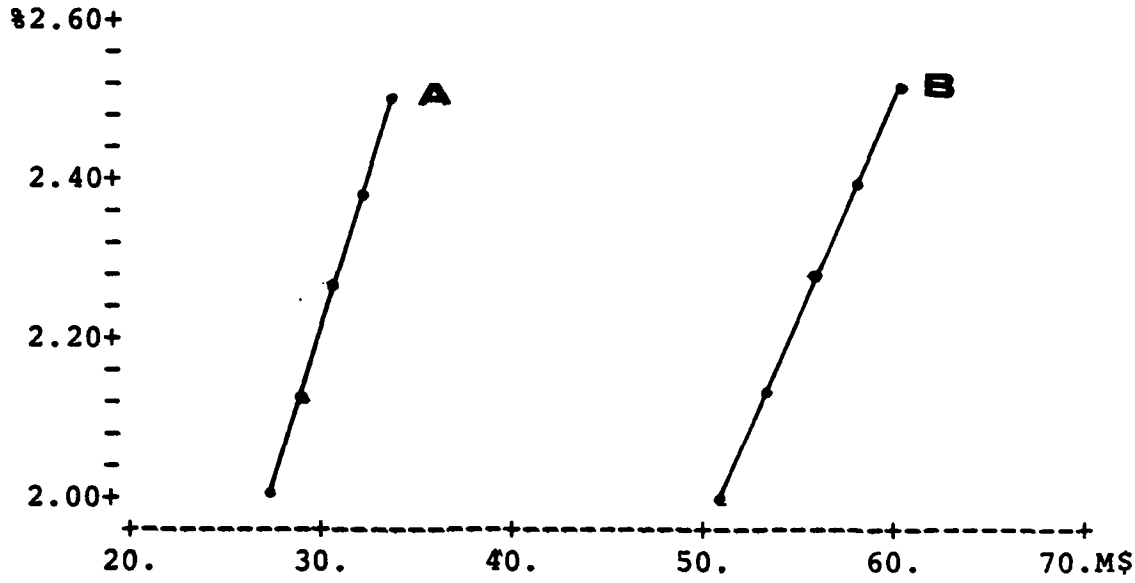


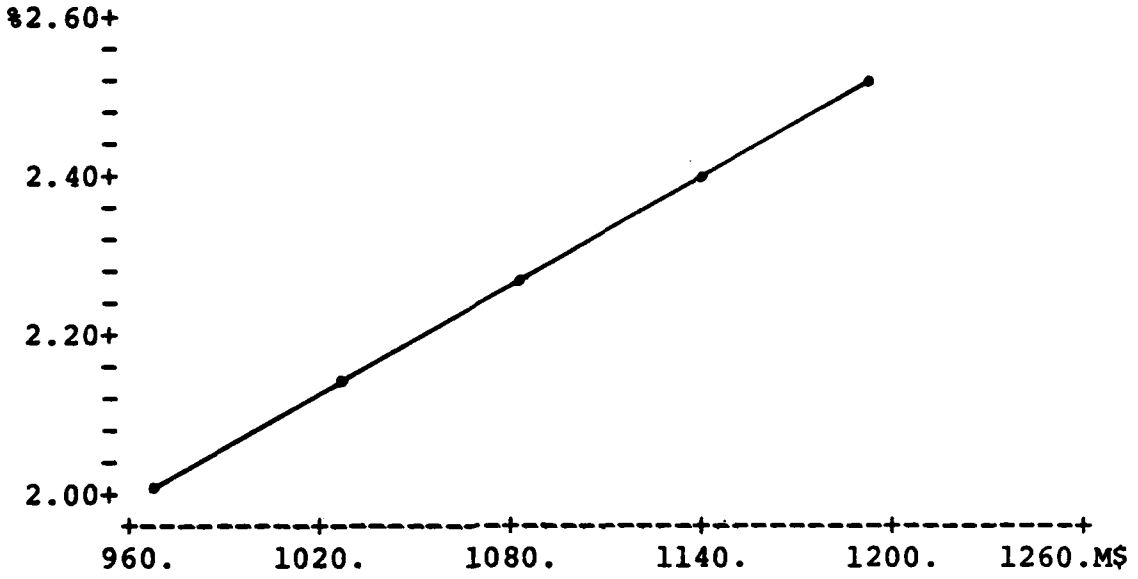
Figure 12 is a graph of the total retirement costs of years 1953 through 1982 plotted against the changing percent of base pay. As in Figure 11, there is a constant positive input/output relationship. The linear function TRC = \$.406M + (\$484.6M x PAY%) provided an R^2 of 99.9 with a standard deviation of .09667.

Figure 12

Total Retirement Cost

vs

Percent of Base Pay



Appendix J is a listing of the annual retirement costs for all years 1953 through 1982 for each of the percent of base pay values.

9. Maximum Allowed Percent of Base Pay Sensitivity

Sensitivity analysis of the maximum allowed percent of base pay to which the member is entitled at retirement (MAX%), was conducted in the same manner as the discount rate analysis. The maximum percent of base pay (MAX%) is currently set by law at 75 percent of the final active base pay and is the upper bound. The maximum percent of base pay (MAX%), was examined over a range of 50 percent to 75 percent in 5 percent increments. Table XIV lists the maximum percent of base pay value (MAX%), the 1963 annual retirement cost

(1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC), for the selected range. The baseline configuration with a TRC of $1,1210M is the MAX% value of 75 percent.

TABLE XIV

MAXIMUM PERCENT OF BASE PAY EFFECTS

MAX%	1963	1982	TRC
50%	$29.3M	$54.9M	$1,040 M
55	31.9	59.8	1,130
60	33.4	62.5	1,180
65	34.1	63.6	1,200
70	34.4	64.3	1,210
75	34.5	64.4	1,210

Figure 13 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing maximum percent of base pay. Both years display an initially strong positive relationship, tapering to almost no effect at the higher end of the selected range. 1963 varies by $5.2M and 1982 varies by $9.5M over the selected range. Savings from a reduction of 75 to 70 percent in either year group amount to $100K.

Figure 13

1963(A) and 1982(B) Year Group Retirement Costs

vs

Maximum Percent of Base Pay

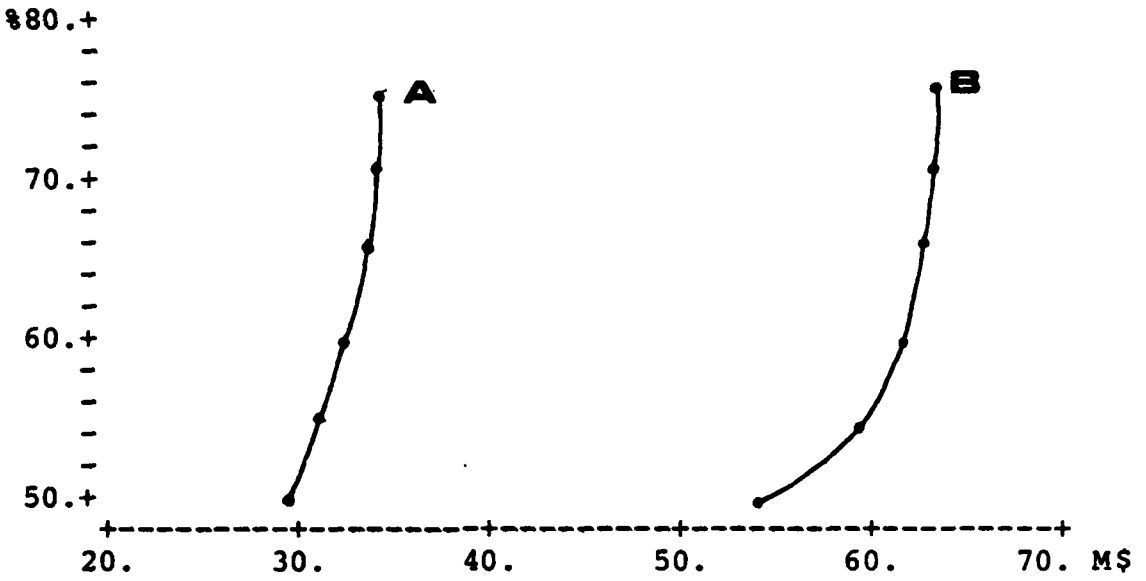


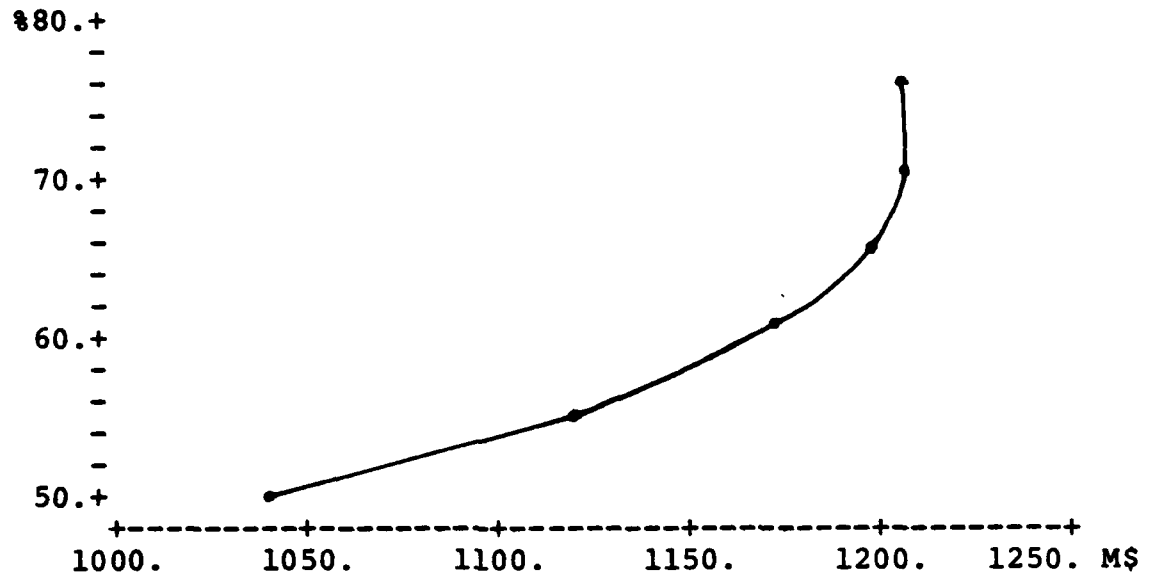
Figure 14 is a graph of the total retirement costs of years 1953 through 1982 plotted against the changing maximum percent of base pay. The initial positive input/output relationship at the low 50 percent through 60 percent range deteriorates into almost no effect at the high 70 percent through 75 percent maximum percent of base pay levels. This unique response pattern is caused by the relatively few service members who remain for a full 30 year retirement and thereby encounter the 75 percent restriction. An R^2 of 98.9 (with a standard deviation of 9.308), was provided by the parabolic function TRC = \$895M + (\$60.2M x MAX%) - (\$.429M x MAX^2).

Figure 14

Total Retirement Cost

vs

Maximum Percent of Base Pay



Appendix K is a listing of the annual retirement costs for all years 1953 through 1982 for each of the maximum percent of base pay values.

10. Minimum Length of Service to Retire Sensitivity

Sensitivity analysis of the minimum length of service required for retirement eligibility (MLOS), was conducted in a manner similar to the discount rate analysis. The current minimum length of service for retirement is 20 years. The analysis attempted to examine the impact of adjusting the minimum retirement upward to 30 years in 1 year increments. An assumption was made that if a paygrade's average length of service was less than the trial MLOS value, then the population of that paygrade was retained until the minimum

retirement point with the condition that the population was decremented by 2 percent for each year of extension. For example, paygrade E6 normally retires at 21.0 years of service. If the trial MLOS value was 23.0 years of service, the population of retiring E6's would be reduced by $(.98)^2$ for 2 years to a level of 96.04 percent of its previous retirement population. This is an arbitrary decrement which yielded mixed results as displayed in Table XV which lists the minimum length of service (MLOS), the 1963 annual retirement cost (1963), the 1982 annual retirement cost (1982), and the total retirement cost (TRC), for the selected range. The baseline configuration with a TRC of $1,120M is the MLOS value of 20 years.

TABLE XV

MINIMUM LENGTH OF SERVICE EFFECTS

MLOS	1963	1982	TRC
20yrs	$34.5M	$64.4M	$1,210 M
21	34.5	64.4	1,210
22	35.2	65.6	1,250
23	34.9	65.1	1,250
24	34.4	64.1	1,250
25	34.1	63.5	1,250
26	34.5	64.4	1,290
27	33.6	62.8	1,270
28	32.7	61.1	1,260
29	31.7	59.1	1,230
30	30.6	57.1	1,210

Figure 15 is a graph of the annual retirement costs for years 1963 and 1982 plotted against the changing minimum length of service. It is an unusual pattern for both 1963 and 1982 year groups. The data can be addressed as 3 clusters.

There is no effect for an addition of 1 year, raising the minimum length of service to 21 years. Between the years 22 and 25, there appears to be no discernible pattern in either year. Years 26 through 30 show a decreasing trend. 1963 annual retirement cost varied by $4.6M and 1982 annual retirement cost varied by $8.5M over the selected range.

Figure 15

1963(A) and 1982(B) Year Group Retirement Costs

vs

Minimum Length of Service

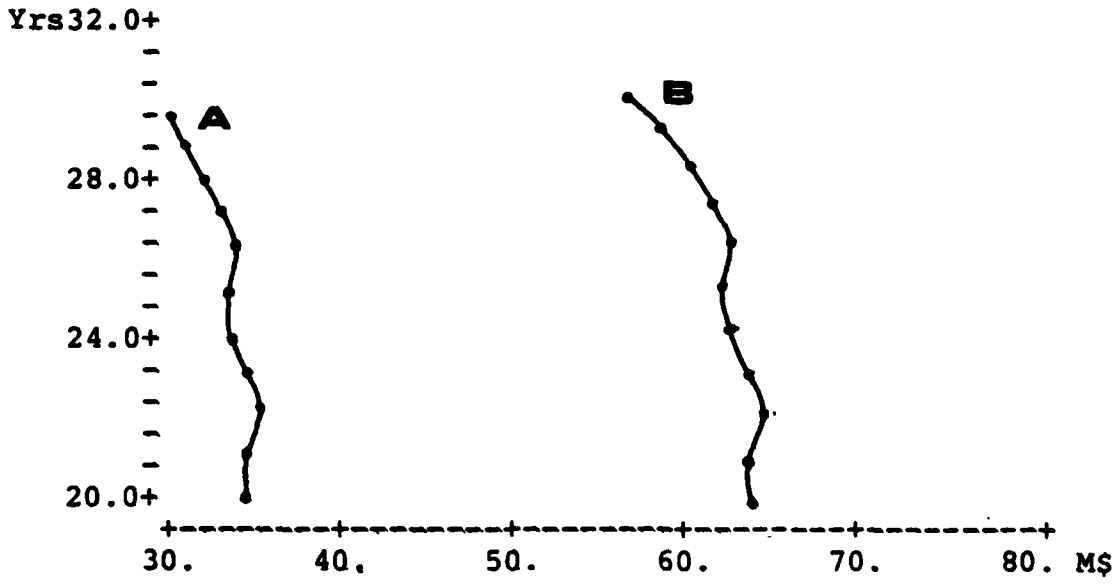


Figure 16 is a graph of the total retirement costs of years 1953 through 1982 plotted against the changing minimum length of service. The same clustering effect as discussed for years 1963 and 1982 was found. No functional relationship meeting the R^2 criteria of .95 was found. It does appear, however, that mandatory retention to the 30 year

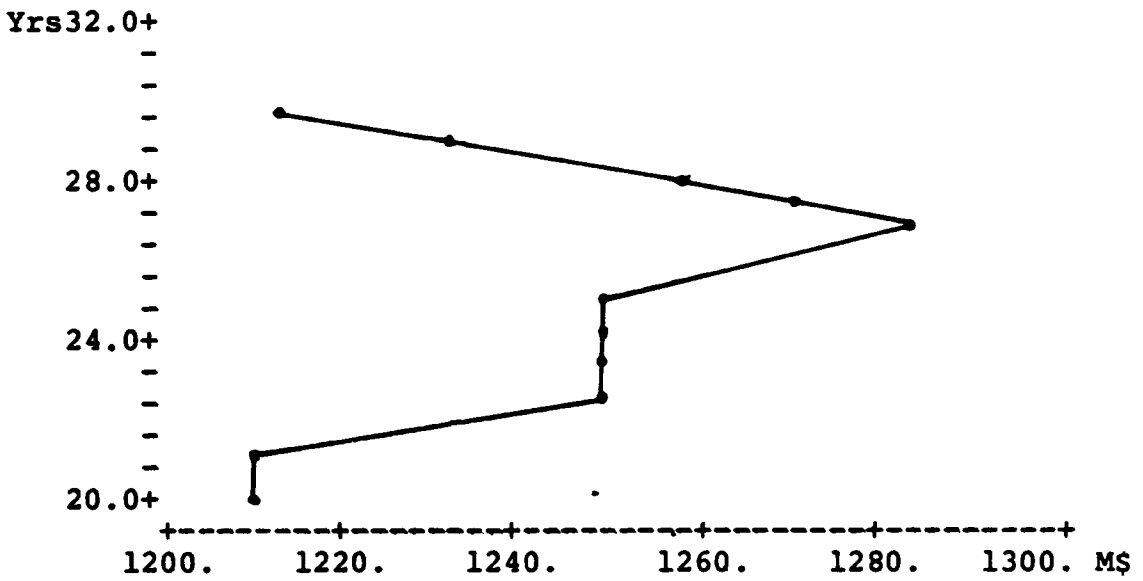
point allows the decrease in life expectancy to balance the increase in retirement annuity costs.

Figure 16

Total Retirement Cost

vs

Minimum Length of Service



Appendix L is a listing of the annual retirement costs for all years 1953 through 1982 for each of the maximum percent of base pay values.

C. AGGREGATE ENTRY AGE NORMAL SENSITIVITY ANALYSIS

Currently, the aggregate entry age normal cost method is the actuarial model used by the Department of Defense in computing the annual valuation of military retirement. The method used by the Department of Defense is a modified form of the aggregate entry age normal method described by Waterman (1983). In addition to ordinary retirement costs (pension costs), the Department of Defense also includes the costs

of some items like disability, and survivor benefit costs, which are usually considered as self insurance and separate from retirement costs. The Department of Defense places the costs associated with the Survivor Benefit Plan (which extends limited annuity amounts to surviving spouses after the death of the retiree) in the retirement cost pool. However, U.S. government Cost Accounting Standard 416, Accounting for Insurance Costs, uses survivor death benefits as an illustrative case in insurance costing. Although the Cost Accounting Standards apply only to firms doing business with the U.S. government and not the government itself, it is interesting to note this deviation from accepted accounting technique. The Department of Defense model produces significantly larger total retirement cost estimates than the previously discussed individual entry age normal computations because in addition to including disability and survivor benefit annuities, the Department of Defense model also includes both regular and reserve personnel.

In addition to this mixture of both conventional retirement and self insurance costs, the Department of Defense also includes the present value of future normal benefits of both active duty and retired personnel. While this grouping of all costs together (hence the term aggregate) is useful in a macro-managerial sense, it hinders any attempt at conventional sensitivity analysis which attempts to isolate input/output relationships.

In spite of the obstacles in the aggregate entry age normal model to sensitivity analysis discussed above, a limited incremental analysis was attempted by varying the present value of future normal benefits over a range of minus 5 percent to plus 5 percent of the Department of Defense estimate (PVB%), while holding the present value of future base pay constant. The baseline total retirement cost for fiscal year 1983 of $15.0 billion is associated with a PVB% value of 0 (meaning no adjustment to the present value of future benefits). Note that the data in Table XVI applies to the Department of Defense as a whole and is not isolated to reflect only regular Navy costs as in the individual model. As in the individual sensitivity analysis, an R^2 acceptability criterion of .95 was established.

TABLE XVI

1983 AGGREGATE TOTAL RETIREMENT COST I

PVB%	PV Future Benefits	PV Future Pay	TRC
-5%	$128.5B	$266.7B	$14.3B
-4	129.9	266.7	14.4
-3	131.2	266.7	14.6
-2	132.6	266.7	14.7
-1	133.9	266.7	14.9
0	135.3	266.7	15.0
+1	136.7	266.7	15.2
+2	138.0	266.7	15.3
+3	139.4	266.7	15.5
+4	140.7	266.7	15.6
+5	142.1	266.7	15.8

Figure 17 is the graph of the data in Table XVI. The input/output relationship is a positive linear function. An R^2 of 99.7 with a standard deviation of .02752 was provided

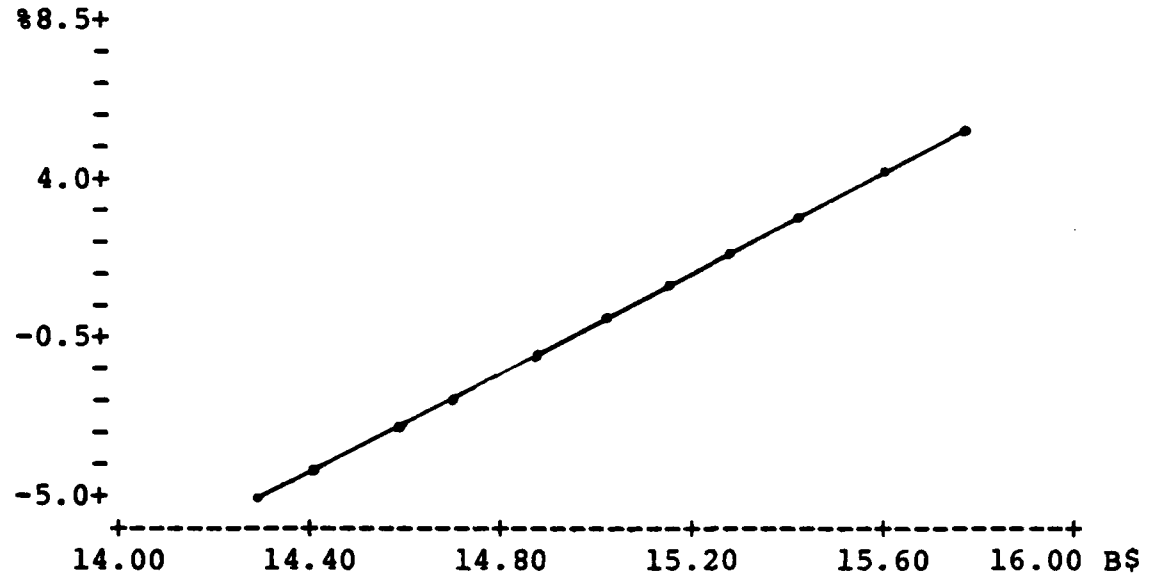
by the linear equation TRC = $15.0B + ($.15B x PVB%). The total retirement cost varies by $1.5B over the selected range.

Figure 17

Total Retirement Cost

vs

PV Future Benefits



The inverse of the previous analysis, holding future benefits constant by varying the present value of future pay (PVP%), provides the results in Table XVII. Note than zero (0) is the baseline TRC of $15.0 billion.

TABLE XVII

1983 AGGREGATE TOTAL RETIREMENT COST II

PVP%	PV Future Benefits	PV Future Pay	TRC
-5%	$135.3B	$253.4B	$15.8B
-4	135.3	256.0	15.6
-3	135.3	258.7	15.5
-2	135.3	261.4	15.3
-1	135.3	264.0	15.2
0	135.3	266.7	15.0
+1	135.3	269.4	14.9
+2	135.3	272.0	14.7
+3	135.3	274.7	14.6
+4	135.3	277.4	14.4
+5	135.3	280.0	14.3

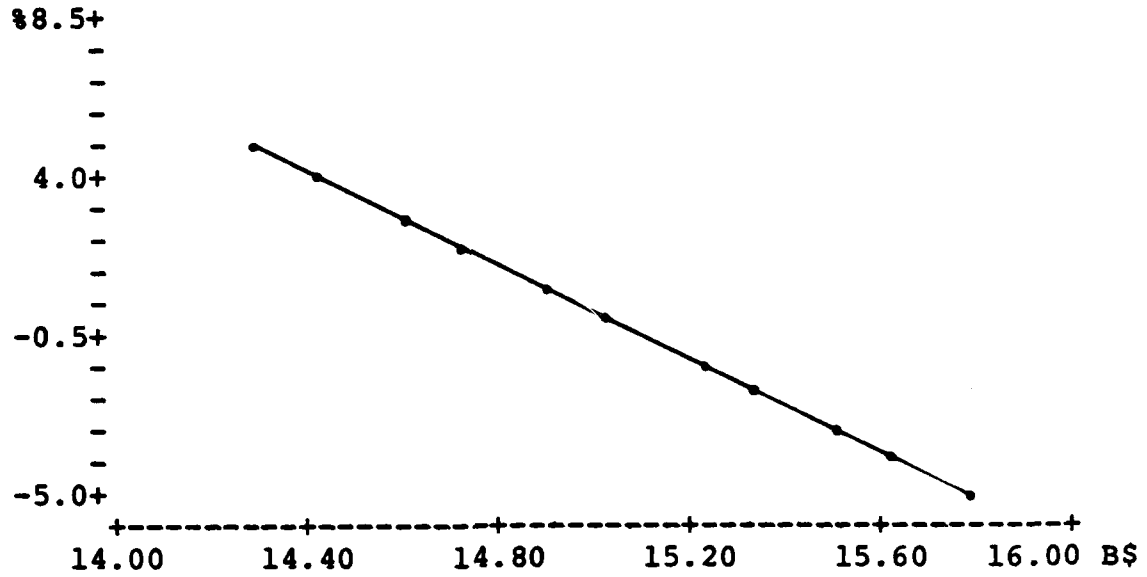
Figure 18 is the graph of the data in Table XVII. The input/output relationship is an inverse linear function. An R^2 of 99.7 with a standard deviation of .02752 was provided by the linear equation TRC = \$15B - (\$.15B x PVP%). Note that this is the exact inverse of the Future Benefit functions addressed in Figure 17. The total retirement cost varies by \$1.5B over the selected range.

Figure 18

Total Retirement Cost

vs

PV Future Pay



III. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

A. DISCUSSION AND CONCLUSIONS

1. Individual Entry Age Normal Conclusions

The Chapter II individual entry age normal data valuations result in the sensitivity ranking displayed in Table XVIII. The variables are listed in order of most sensitive to least sensitive. The sensitivity rankings were determined from the baseline case by examining the effect a 10 percent change in input value had upon the percent based variables; the effect a 2 year (i.e. 10 percent of 20 years) change in value had upon the time based variables; and the effect a .016 change in value (i.e. 10 percent of the average new Navy entrant retirement probability of .158) had upon entrant retirement probability. These input change values are listed under the heading "Inc Value" in Table XVIII. Listings under the "DIFF" heading show the difference in millions of dollars of total retirement cost resulting from the incremental changes. The listing "DIFF%" shows the percentage variation in total retirement cost caused by the incremental change (i.e. DIFF% + DIFF/$1,210M). The heading "Controllability" refers to the previously discussed controllability (C) or uncontrollability (U) of the variable. The minimum length of service (MLOS) variable was included but not ranked in the sensitivity ranking because of its disorderly input/output relationship and a

2 year increase in value (i.e. 10 percent of 20 years) would have placed the output in the unpredictable second data cluster.

TABLE XVIII

INDIVIDUAL ENTRY AGE NORMAL SENSITIVITY RANKING

Variable	Inc Value	DIFF	DIFF%	Controllability
DIS%	.9%	$297.4M	24.5%	U
PAY%	.25%	121.1	10.0	U
ERPD	.016	114.9	9.5	C
SAL%	5.5%	95.9	7.9	U
LOSD	2yrs	46.5	3.8	C
LEXPD	2yrs	12.2	1.0	U
MAX%	7.5%	2.0	.1	U
MLOS	N/A	N/A	N/A	C

Table XVIII shows the domination of the uncontrollable discount rate (DIS%) in the individual entry age normal computation of current retirement costs. As in any annuity calculation, the reinvestment rate is a highly critical input. Under the baseline assumptions, a 10 percent change in the discount rate yields a 24.5 percent change in total retirement costs. The legislated percent of base pay per year of active duty (PAY%) delivers a response in total retirement cost corresponding to adjustments in its current rate. Of the variables controllable at the service level, adjustments to the overall retention until retirement (ERPD) seem to offer the most promise in managing retirement costs. Adjustments to the expected rate of salary increase, the domain of Congress, while effective in controlling active duty base pay, do not impact retirement costs to a like degree. It is interesting to note than an increase in average length of

service (LOSD) of two years has a surprisingly low corresponding retirement cost increase. Efforts to increase retention after retirement eligibility is reached would increase the overall experience level of the service and (assuming experienced personnel perform better than inexperienced) may produce a superior performance/product to cost ratio. Adjustments to life expectancy (LEXPD) and the maximum allowed percentage of base pay (MAX%) have little effect. The disorderly nature of output resulting from adjustments to the minimum length of service (MLOS) infers that although this variable is controllable at the service level, further research is required as to probable retirement cost effects.

The sensitivity results in Table XVIII must be approached with caution. Each of the variable values which comprise the baseline configuration differ in their inherent accuracy. The discount rate (DIS%) and rate of salary increase (SAL%), being functions of future economic performance, can each be legitimately estimated at several different values. For this reason, they are both "soft" numbers in which excessive confidence should not be placed. At the opposite end of the reliability spectrum are variable values for percent of base pay at retirement (PAY%), maximum allowed percentage of base pay (MAX%), and minimum length of service to retire (MLOS). Each of these values is fixed in law and therefore will probably remain constant for the long term. Confidence in variable values for retention until retirement (ERPD),

average length of service at retirement (LOSD), and life expectancy at retirement (LEXPD) lies in-between the two poles discussed above, since although only estimates, they have been subject to actuarial review.

The estimating equations for each of the input variables are listed in Table XIX. This table displays the variable, its TRC estimating equation (TRC Value), and the associated coefficient of determination (R^2).

TABLE XIX

SELECTED BASELINE ESTIMATING EQUATIONS

Variable	TRC Value	R^2
DIS%	Antilog ($9.15M - ($.226M x DIS%))	99.9
PAY%	$.406M + ($484.6M x PAY%)	99.9
ERPD	$1212M + ($71.7M x ERPD)	99.9
SAL%	$501.3M + ($133.3M x SAL%)	99.1
LOSD	$1219M + ($19.7M x LOSD)	95.2
LEXPD	$1214M + (5.54M x LEXPD)	99.4
MAX%	-$895M + ($60.2M x MAX%) - ($42.9M x MAX%^{2})	98.9
MLOS	N/A	N/A

Usually, such small samples as used in the regression analysis of the sensitivity results are of limited value. However, coefficient of determination's as large as 99.9 imply that the regression line is a good approximation of the analytical relationship between TRC and the associated variable in the range of sensitivity analysis. This method has fortunately generated apparently reliable approximations to

relationships that would have been very difficult (untractable) to solve analytically. These equations can be used by manpower managers to estimate the effects of a change in one of the variables in Table XIX without generating a new TRC value from the computer program. They serve as a useful method for quickly estimating the impact of such changes when the computer program is not easily available.

In addition, the same methodology which produced the above estimating equations can be applied to any given set of economic, managerial or legal input variable assumptions to provide manpower managers with easy to use retirement cost estimators.

2. Aggregate Entry Age Normal Conclusions

As mentioned in Chapter II, the grouping of all costs together in the aggregate entry age normal cost model severly hampers meaningful sensitivity investigation. The data analysis performed in Chapter II with the aggregate model illustrates that the aggregate model readily provides answers to large scale questions. For example, a decrease in retirement benefits of one (1) percent would save the Department of Defense one hundred (100) million dollars in 1983. However, as a service management tool, its very broadness minimizes its usefulness at any level below that of the Department of Defense.

B. RECOMMENDATIONS

1. Further study be performed examining the effects of increasing the required length of service before retirement eligibility.

2. The Department of Defense Actuary consider publishing an annual report, for internal Department of Defense and service level management use, which provides current retirement costing by paygrade by year group. And, that the Department of Defense Actuary include, in that same report, the value of retirement costs under a reasonable range of differing economic assumptions.

APPENDIX A

THE ENTRYAGE MODEL

I. OVERVIEW

The Entryage computer model is an interactive computer program written in the standard BASIC computer programming language. It is designed to calculate normal and total retirement costs under both individual and aggregate entry age normal retirement costing methods. The only deviations from standard, required by the IBM 3033 system on which the program was developed, are the use of apostrophes (') vice quotations marks (") in Print Commands, and the FORTRAND convention of double asterisks (**) vice the up arrow (↑) for exponentation. In addition to the two above required deviations, the author has taken advantage of the capability of the System 3033 to use numeric variable names with lengths in excess of two (2) characters, which is prohibited on some micro/mini computers.

Entryage can be logically broken into five (5) subsections:

1. Introduction/Subprogram Selection. Lines 5-55 and 951-953.
2. Matrix Descriptions/Data Load. Lines 75-950.
3. Detailed Individual Subprogram. Lines 955-2355.

4. Aggregate Subprogram. Lines 2365-2655.

5. Summary Individual Subprogram. Lines 2700-3890.

II. DETAILED PROGRAM DESCRIPTION

A. INTRODUCTION/SUBPROGRAM SELECTION

This section introduces the model, states the current year for processing purposes, and requests subprogram selection or program termination (lines 5-55). The program automatically enters the next subsection, Matrix Descriptions/ Data Load, and then processes the subprogram or termination command (lines 951-953). Advancement to the Detailed Individual Subprogram is done by default. All three computation subprograms, after completion of calculations and output display, loop back to line 5.

B. MATRIX DESCRIPTIONS/DATA LOAD

This section stores the data required for computation in nine (9) matrices. A description of each and its data site follows:

1. Current Year Pay

The Current Year Pay matrix, "P", is dimensioned in line 80. Lines 125-255 assign coordinates in a 26 column by 6 row field. Lines 415-455 contain pay amounts for pay grades E1-E9; lines 460-475 contain pay amounts for pay grades W1-W4; lines 480-505 contain pay amounts for pay grades 01, 01E, 02, 02E, 03, and 03E; and lines 510-540 contain pay amounts for pay grades 04-010. There are six (6) pay amounts

per line. These correspond to pay entitlements for 20, 22, 24, 26, 28 and 30 years. It is mandatory that each row be filled, even though at present (1983) there are no pay increases at the 24, 28, or 30 year points. The program has been designed to absorb pay increases at these points with no structural modification. Current pay rates, for FY 1983, were received from the Disbursing Office, Naval Postgraduate School.

2. Enlisted Life Expectancy

The Enlisted Life Expectancy matrix, "E", is dimensioned in line 85. Lines 260-275 assign coordinates in a simple 31 unit column. Lines 550-560 correspond to remaining enlisted life expectancies at retirement for ages 36-66 years. Navy enlisted life expectancies at retirement, entered in the program, are from the FY82 DOD Statistical Report on the Military Retirement System, page 242 (U.S. Government Printing Office, 1983).

3. Officer Life Expectancy

The Officer Life Expectancy matrix, "OZ", is dimensioned in line 90. Lines 280-295 assign coordinates in a simple 31 unit column. Lines 565-580 correspond to remaining officer life expectancies at retirement for ages 36-66 years. Navy officer life expectancies at retirement, entered in the program, are from the FY82 Statistical Report, page 242.

4. Average Length of Service

The Average Length of Service matrix, "D" is dimensioned in line 95. Lines 300-315 assign coordinates in a

simple 26 unit column. Lines 585-600 correspond to the average length of service which a paygrade has completed at retirement. The linear sequence is that of the Current Year Pay matrix, with E1-E9, W1-W4, 01, 01E, 02, 02E, 03, 03E, and 04-010. Navy average length of service data, entered in the program, is from the FY82 Statistical Report, page 97.

5. Average Age at Retirement.

The Average Age at Retirement matrix, "F", is dimensioned in line 100. Lines 320-335 assign coordinates in a simple 26 unit column. Lines 605-620 correspond to the average age at retirement for retirees in each paygrade. The linear sequence is identical to the Current Year Pay and Average Length of Service matrices. Navy average age at retirement data, entered in the program, is from the FY82 Statistical Report, page 76.

6. Target Retirement Grade Probability

The Target Retirement Grade Probability Matrix, "F2", is dimensioned in line 105. Lines 340-355 assign coordinates in a simple 26 unit column. Lines 625-640 correspond to the probability that a retiring service member will retire at a given pay grade. These probabilities are separately computed for enlisted and officer members. Officers retiring at grades W1-03E are assumed to have originally entered military service as enlistees, since the "up or out" officer personnel management system prohibits retirement by service members, who have exclusively served as officers, at less than

04 rank. Navy retirement grade probabilities were derived from information listed in FY82 Statistical Report, pages 76 and 97.

7. Enlisted Accession

The Enlisted Accession matrix, "ED", is dimensioned in line 115. Lines 360-380 assign coordinates in a simple 32 unit column. Lines 650-660 correspond to the number of regular enlisted entrants for the years 1951 through 1982, in thousands (e.g. 63.9 equals 63,900). Number of regular Navy enlisted entrants data was received from the Defense Manpower Data Center, Monterey, Ca., at the request of the program developer.

8. Officer Accession

The Officer Accession matrix, "OD", is dimensioned in line 120. Lines 385-400 assign coordinates in a simple 32 unit column. Lines 665-680 correspond to the number of regular officer entrants for the years 1951 through 1982, in thousands. Number of regular Navy officer entrants data was received from the Defense Manpower Data Center, Washington, D.D., at the request of the program developer.

9. Previous Year Pay

The Previous Year Pay matrix, "R", is dimensioned in line 110. Lines 685-815 assign coordinates in a 26 column by 6 row field. This matrix and its associated data are designed exactly like the Current Year Pay matrix. Lines 820-950 contain pay amounts for the previous year (1982).

Previous pay rates, for FY 1982, were received from the Disbursing Office, Naval Postgraduate School.

C. DETAILED INDIVIDUAL SUBPROGRAM

This section is an interactive model which produces detailed information at the individual pay grade and year of service entry level. All program volunteered information is either derived or computed from matrix loaded information, with the user option to modify any input at will. Retired pay computations for post 1980 entrants are subject to the required three year averaging, with the assumption that the pay grade at retirement was held for the two (2) years prior to retirement (lines 2265-2300). The subprogram also assumes a .12 probability of retirement for enlisted entrants and a .40 probability of retirement for officer entrants (lines 1860-1865). These probabilities were found in the Valuation of the Military Retirement System, FY 1982, page 10 (U.S. Government Printing Office, 1083).

D. AGGREGATE SUBPROGRAM

The aggregate subprogram is an interactive subprogram which requires real time input of data. The information stored in the matrices is not available to this subprogram. It is straight forward, and has no "hardwired" probability assumptions.

E. SUMMARY INDIVIDUAL SUBPROGRAM

The summary individual subprogram utilites the matrices data and provides both normal costs and total retirement

costs for years 1953 through 1982. It is computationally the same as the detailed individual subprogram, except that when the minimum length of service to retire is adjusted, an attrition factor (DELT) is applied against the retiring population (line 3707) which assumes a 98 percent retention rate per year of service extension beyond the normal length of service to retire for a particular pay grade. Two different print formats, "Summary" and "Detail" are available (lines 3066-3067).

III. UPDATING INSTRUCTIONS

A. INTRODUCTION

These updating instructions are designed to enable a potential user to load current data into the model, not perform major computational logic modifications. Updating requirements may be divided into two areas: minor program modification and data changes. Instructions are given for an update to 1984.

B. MINOR PROGRAM MODIFICATION

1. Lines 45, 125, 410, 1190, 1920, 3280, and 3570. Change "1983" to "1984".

2. Lines 820 and 3855. Change "1982" to "1983".

3. Lines 1920 and 3570. Change "1950" to "1951".

4. Line 3080. Change "1953" to "1954".

C. DATA CHANGES

All data changes must be input in format identical to that already used in Entryage Wbasic. Please review the program data itself (lines 410-95) and refer to the Matrix Descriptions section of this appendix before following the following instructions:

1. Lines 415-540. Load current pay amounts, for 1984, in ascending order, E1 through O10, for 20-30 years of service in two year increments.

2. Line 650. Delete first enlisted accession number for 1951, "202.4".

3. Line 660. Add additional enlisted accession number for 1983 in last position.

4. Line 670. Delete first officer accession number for 1951, "8".

5. Line 680. Add additional officer accession number for 1983 in last position.

6. Lines 825-950. Replace 1982 pay data with 1983 pay data. May be gang loaded by renumbering information previously stored in lines 415-540 before current update processing.

7. Other data sites may be update as desired. Consult Matrix Descriptions for specific sequence logic.

```
00005 REM START OF ENTRYAGE PROGRAM
00010 PRINT '*************************************************************'
00015 PRINT 'THIS IS A THREE PART INTERACTIVE PROGRAM.  IT CALCULATES INDI-'
00020 PRINT 'VIDUAL AND AGGREGATE MILITARY RETIREMENT COSTS.  AT THIS POINT'
00025 PRINT 'PLEASE TYPE IN IND FOR THE INDIVIDUAL METHOD COST CALCULATIONS,'
00030 PRINT 'AGG FOR AGGREGRATE METHOD COST CALCULATIONS, OR GANG FOR EXPANDED '
00035 PRINT 'MULTI YEAR INDIVIDUAL COST CALCULATIONS.  IF YOU WISH TO EXIT  '
00040 PRINT 'THE PROGRAM TYPE HALT.  PROGRAM LOADED DATA HAS BEEN DERIVED FROM'
00045 PRINT 'DEPARTMENT OF DEFENSE SOURCES AND CONSIDERS 1983 TO BE THE CURRENT'
00046 PRINT 'YEAR.  PLEASE ENTER YOUR PROGRAM CHOICE AT THIS TIME.'
00050 PRINT '*************************************************************'
00055 INPUT CK$
00075 RESTORE
00080 DIM P(27,7)
00085 DIM E(32)
00090 DIM OZ(32)
00095 DIM D(27)
00100 DIM F(27)
00105 DIM FZ(27)
00110 DIM R(27,7)
00115 DIM ED(35)
00120 DIM OD(35)
00125 REM 1983 PAY MATRIX
00130 READ P(1,1),P(1,2),P(1,3),P(1,4),P(1,5),P(1,6)
00135 READ P(2,1),P(2,2),P(2,3),P(2,4),P(2,5),P(2,6)
00140 READ P(3,1),P(3,2),P(3,3),P(3,4),P(3,5),P(3,6)
00145 READ P(4,1),P(4,2),P(4,3),P(4,4),P(4,5),P(4,6)
00150 READ P(5,1),P(5,2),P(5,3),P(5,4),P(5,5),P(5,6)
00155 READ P(6,1),P(6,2),P(6,3),P(6,4),P(6,5),P(6,6)
00160 READ P(7,1),P(7,2),P(7,3),P(7,4),P(7,5),P(7,6)
00165 READ P(8,1),P(8,2),P(8,3),P(8,4),P(8,5),P(8,6)
00170 READ P(9,1),P(9,2),P(9,3),P(9,4),P(9,5),P(9,6)
00175 READ P(10,1),P(10,2),P(10,3),P(10,4),P(10,5),P(10,6)
00180 READ P(11,1),P(11,2),P(11,3),P(11,4),P(11,5),P(11,6)
00185 READ P(12,1),P(12,2),P(12,3),P(12,4),P(12,5),P(12,6)
00190 READ P(13,1),P(13,2),P(13,3),P(13,4),P(13,5),P(13,6)
00195 READ P(14,1),P(14,2),P(14,3),P(14,4),P(14,5),P(14,6)
00200 READ P(15,1),P(15,2),P(15,3),P(15,4),P(15,5),P(15,6)
00205 READ P(16,1),P(16,2),P(16,3),P(16,4),P(16,5),P(16,6)
00210 READ P(17,1),P(17,2),P(17,3),P(17,4),P(17,5),P(17,6)
00215 READ P(18,1),P(18,2),P(18,3),P(18,4),P(18,5),P(18,6)
00220 READ P(19,1),P(19,2),P(19,3),P(19,4),P(19,5),P(19,6)
00225 READ P(20,1),P(20,2),P(20,3),P(20,4),P(20,5),P(20,6)
00230 READ P(21,1),P(21,2),P(21,3),P(21,4),P(21,5),P(21,6)
00235 READ P(22,1),P(22,2),P(22,3),P(22,4),P(22,5),P(22,6)
00240 READ P(23,1),P(23,2),P(23,3),P(23,4),P(23,5),P(23,6)
00245 READ P(24,1),P(24,2),P(24,3),P(24,4),P(24,5),P(24,6)
00250 READ P(25,1),P(25,2),P(25,3),P(25,4),P(25,5),P(25,6)
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00255 READ P(26,1),P(26,2),P(26,3),P(26,4),P(26,5),P(26,6)
00260 REM ENLISTED LIFE EXPECTANCY DATA
00265 READ E(1),E(2),E(3),E(4),E(5),E(6),E(7),E(8),E(9),E(10),E(11)
00270 READ E(12),E(13),E(14),E(15),E(16),E(17),E(18),E(19),E(20),E(21)
00275 READ E(22),E(23),E(24),E(25),E(26),E(27),E(28),E(29),E(30),E(31)
00280 REM OFFICER LIFE EXPECTANCY
00285 READ OZ(1),OZ(2),OZ(3),OZ(4),OZ(5),OZ(6),OZ(7),OZ(8),OZ(9),OZ(10),OZ(11)
00290 READ OZ(12),OZ(13),OZ(14),OZ(15),OZ(16),OZ(17),OZ(18),OZ(19),OZ(20),OZ(21)
00295 READ OZ(22),OZ(23),OZ(24),OZ(25),OZ(26),OZ(27),OZ(28),OZ(29),OZ(30),OZ(31)
00300 REM AVERAGE LOS MATRIX
00305 READ D(1),D(2),D(3),D(4),D(5),D(6),D(7),D(8),D(9)
00310 READ D(10),D(11),D(12),D(13),D(14),D(15),D(16),D(17),D(18)
00315 READ D(19),D(20),D(21),D(22),D(23),D(24),D(25),D(26)
00320 REM AVERAGE AGE AT RETIREMENT MATRIX
00325 READ F(1),F(2),F(3),F(4),F(5),F(6),F(7),F(8),F(9)
00330 READ F(10),F(11),F(12),F(13),F(14),F(15),F(16),F(17),F(18)
00335 READ F(19),F(20),F(21),F(22),F(23),F(24),F(25),F(26)
00340 REM TARGET RETIREMENT GRADE PROBABILITY MATRIX
00345 READ FZ(1),FZ(2),FZ(3),FZ(4),FZ(5),FZ(6),FZ(7),FZ(8),FZ(9)
00350 READ FZ(10),FZ(11),FZ(12),FZ(13),FZ(14),FZ(15),FZ(16),FZ(17),FZ(18)
00355 READ FZ(19),FZ(20),FZ(21),FZ(22),FZ(23),FZ(24),FZ(25),FZ(26)
00360 REM ENLISTED ACCESSION MATRIX
00365 READ ED(1),ED(2),ED(3),ED(4),ED(5),ED(6),ED(6),ED(8),ED(9),ED(10),ED(11)
00370 READ ED(12),ED(13),ED(14),ED(15),ED(16),ED(17),ED(18),ED(19),ED(20),ED(21)
00375 READ ED(22),ED(23),ED(24),ED(25),ED(26),ED(27),ED(28),ED(29),ED(30),ED(31)
00380 READ ED(32)
00385 REM OFFICER ACCESSION MATRIX
00390 READ OD(1),OD(2),OD(3),OD(4),OD(5),OD(6),OD(7),OD(8),OD(9),OD(10),OD(11)
00395 READ OD(12),OD(13),OD(14),OD(15),OD(16),OD(17),OD(18),OD(19),OD(20),OD(21)
00400 READ OD(22),OD(23),OD(24),OD(25),OD(26),OD(27),OD(28),OD(29),OD(30),OD(31)
00405 READ OD(32)
00410 REM 1983 PAY DATA
00415 DATA 573.6,573.6,573.6,573.6,573.6,573.6
00420 DATA 642.9,642.9,642.9,642.9,642.9,642.9
00425 DATA 762.3,762.3,762.3,762.3,762.3,762.3
00430 DATA 888.6,888.6,888.6,888.6,888.6,888.6
00435 DATA 1102.8,1102.8,1102.8,1102.8,1102.8,1102.8
00440 DATA 1299.3,1299.3,1299.3,1299.3,1299.3,1299.3
00445 DATA 1483.5,1583.1,1583.1,1779.9,1779.9,1779.9
00450 DATA 1681.2,1779.9,1779.9,1978.5,1978.5,1978.5
00455 DATA 1917.9,2019,2019,2215.2,2215.2,2215.2
00460 DATA 1660.8,1660.8,1660.8,1660.8,1660.8,1660.8
00465 DATA 1785.8,1862.4,1862.4,1862.4,1862.4,1862.4
00470 DATA 1994.1,2066.4,2066.4,2139.3,2139.3,2139.3
00475 DATA 2267.7,2243.6,2243.6,2526,2526,2526
00480 DATA 1382.4,1382.4,1382.4,1382.4,1382.4,1384.2
00485 DATA 1716.6,1716.6,1716.6,1716.6,1716.6,1716.6
00490 DATA 1752.6,1752.6,1752.6,1752.6,1752.6,1752.6
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00495 DATA 2029.2,2029.2,2029.2,2029.2,2029.2,2029.2
00500 DATA 2361.9,2361.9,2361.9,2361.9,2361.9,2361.9
00505 DATA 2397.3,2397.3,2397.3,2397.3,2397.3,2397.3
00510 DATA 2731.2,2731.2,2731.2,2731.2,2731.2,2731.2
00515 DATA 3155.7,3266.1,3266.1,3266.1,3266.1,3266.1
00520 DATA 3488.4,3690.9,3690.9,4002.9,4002.9,4002.9
00525 DATA 4555.8,4555.8,4555.8,4555.8,4555.8,4555.8
00530 DATA 4791.6,4791.6,4791.6,4791.6,4791.6,4791.6
00535 DATA 4791.6,4791.6,4791.6,4791.6,4791.6,4791.6
00540 DATA 4791.6,4791.6,4791.6,4791.6,4791.6,4791.6
00545 REM ENLISTED LIFE EXPECTANCY DATA
00550 DATA 37.47,36.57,35.67,34.77,33.86,32.95,32.04,31.14,30.24,29.34,28.46
00555 DATA 27.59,26.73,25.88,25.04,24.22,23.41,22.62,21.86,21.1,20.36
00560 DATA 19.62,18.9,18.18,17.47,16.78,16.1,15.44,14.79,14.16,13.54
00565 REM OFFICER LIFE EXPECTANCY DATA
00570 DATA 40.9,39.97,39.04,38.13,37.2,36.28,35.37,34.45,33.54,32.63,31.73
00575 DATA 30.83,29.94,29.06,28.18,27.31,26.45,25.6,24.75,23.91,23.09
00580 DATA 22.27,21.46,20.65,19.87,19.08,18.31,17.55,16.81,16.07,15.35
00585 REM AVERAGE LOS DATA
00590 DATA 20.8,20.4,20.8,21.21,21.21,21.8,22.7,24.3
00595 DATA 22.1,22.7,23.1,22.7,21.9,21.9,22.5,22.5,24.1
00600 DATA 24.1,24.2,24.9,28,29.9,30.4,30.4,30.4
00605 REM AVERAGE AGE AT RETIREMENT DATA
00610 DATA 38.8,39.8,40.6,40.7,40.5,40,40.9,41.3,42.9
00615 DATA 43,44.1,42.2,47.1,43.1,43.1,44,44,43.6
00620 DATA 43.6,44.4,46.3,50.5,53,56.2,58.1,59.8
00625 REM TARGET RETIREMENT GRADE PROBABILITY DATA
00630 DATA .0001,.0001,.0023,.0128,.0578,.2734,.4229,.101,.0546
00635 DATA .0C5,.C17,.0102,.0129,.0003,.0003,.0044,.0044,.0252
00640 DATA .0252,.3926,.3299,.2586,.002,.0138,.003,.0006
00645 REM ENLISTED ACCESSION DATA
00650 DATA 202.4,171.4,88.1,54.9,121.4,112,80.4,89.7,86.4,91.4,94.2
00655 DATA 107.4,85.3,95,94.3,145.7,101.1,122.8,147.1,100.2,78.7,89.2
00660 DATA 99,83.6,89.7,99.2,104.7,70.1,65.6,75.1,79.1,63.9
00665 REM OFFICER ACCESSION DATA
00670 DATA 8,9,11.9,11.4,9.7,8.8,13.4,8.9,8.9,11,8.6
00675 DATA 11.9,10.5,9.8,10.9,11,13,13.1,13.6,3.5,9.5,11.1
00680 DATA 7.6,6,6.5,6.6,6.6,6.1,7,6.8,7.5,7
00685 REM 1982 PAY DATA
00690 READ R(1,1),R(1,2),R(1,3),R(1,4),R(1,5),R(1,6)
00695 READ R(2,1),R(2,2),R(2,3),R(2,4),R(2,5),R(2,6)
00700 READ R(3,1),R(3,2),R(3,3),R(3,4),R(3,5),R(3,6)
00705 READ R(4,1),R(4,2),R(4,3),R(4,4),R(4,5),R(4,6)
00710 READ R(5,1),R(5,2),R(5,3),R(5,4),R(5,5),R(5,6)
00715 READ R(6,1),R(6,2),R(6,3),R(6,4),R(6,5),R(6,6)
00720 READ R(7,1),R(7,2),R(7,3),R(7,4),R(7,5),R(7,6)
00725 READ R(8,1),R(8,2),R(8,3),R(8,4),R(8,5),R(8,6)
00730 READ R(9,1),R(9,2),R(9,3),R(9,4),R(9,5),R(9,6)
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00735 READ R(10,1),R(10,2),R(10,3),R(10,4),R(10,5),R(10,6)
00740 READ R(11,1),R(11,2),R(11,3),R(11,4),R(11,5),R(11,6)
00745 READ R(12,1),R(12,2),R(12,3),R(12,4),R(12,5),R(12,6)
00750 READ R(13,1),R(13,2),R(13,3),R(13,4),R(13,5),R(13,6)
00755 READ R(14,1),R(14,2),R(14,3),R(14,4),R(14,5),R(14,6)
00760 READ R(15,1),R(15,2),R(15,3),R(15,4),R(15,5),R(15,6)
00765 READ R(16,1),R(16,2),R(16,3),R(16,4),R(16,5),R(16,6)
00770 READ R(17,1),R(17,2),R(17,3),R(17,4),R(17,5),R(17,6)
00775 READ R(18,1),R(18,2),R(18,3),R(18,4),R(18,5),R(18,6)
00780 READ R(19,1),R(19,2),R(19,3),R(19,4),R(19,5),R(19,6)
00785 READ R(20,1),R(20,2),R(20,3),R(20,4),R(20,5),R(20,6)
00790 READ R(21,1),R(21,2),R(21,3),R(21,4),R(21,5),R(21,6)
00795 READ R(22,1),R(22,2),R(22,3),R(22,4),R(22,5),R(22,6)
00800 READ R(23,1),R(23,2),R(23,3),R(23,4),R(23,5),R(23,6)
00805 READ R(24,1),R(24,2),R(24,3),R(24,4),R(24,5),R(24,6)
00810 READ R(25,1),R(25,2),R(25,3),R(25,4),R(25,5),R(25,6)
00815 READ R(26,1),R(26,2),R(26,3),R(26,4),R(26,5),R(26,6)
00820 REM 1982 PAY DATA
00825 DATA 551.4,551.4,551.4,551.4,551.4,551.4
00830 DATA 618.3,618.3,618.3,618.3,618.3,618.3
00835 DATA 732.9,732.9,732.9,732.9,732.9,732.9
00840 DATA 854.4,854.4,854.4,854.4,854.4,854.4
00845 DATA 1060.5,1060.5,1060.5,1060.5,1060.5,1060.5
00850 DATA 1249.2,1249.2,1249.2,1249.2,1249.2,1249.2
00855 DATA 1426.5,1522.2,1522.2,1711.5,1711.5,1711.5
00860 DATA 1616.4,1711.5,1711.5,1902.3,1902.3,1902.3
00865 DATA 1844.1,1941.3,1941.3,2130,2130,2130
00870 DATA 1596.9,1596.9,1596.9,1596.9,1596.9,1596.9
00875 DATA 1721.1,1790.7,1790.7,1790.7,1790.7,1790.7
00880 DATA 1917.3,1986.9,1986.9,2057.1,2057.1,2057.1
00885 DATA 2180.4,2253.6,2253.6,2428.8,2428.8,2428.8
00890 DATA 1329.3,1329.3,1329.3,1329.3,1329.3,1329.3
00895 DATA 1650.6,1650.6,1650.6,1650.6,1650.6,1650.6
00900 DATA 1685.1,1685.1,1685.1,1685.1,1685.1,1685.1
00905 DATA 1951.2,1951.2,1951.2,1951.2,1951.2,1951.2
00910 DATA 2271,2271,2271,2271,2271,2271
00915 DATA 2305.2,2305.2,2305.2,2305.2,2305.2,2305.2
00920 DATA 2626.2,2626.2,2626.2,2626.2,2626.2,2626.2
00925 DATA 3034.2,3140.4,3140.4,3140.4,3140.4,3140.4
00930 DATA 3314.3,3349,3349,3849,3849,3849
00935 DATA 4176,4176,4176,4176,4176,4176
00940 DATA 4176,4176,4176,4176,4176,4176
00945 DATA 4176,4176,4176,4176,4176,4176
00950 DATA 4176,4176,4176,4176,4176,4176
00951 IF (CK$='HALT') THEN STOP
00952 IF (CK$='AGE') THEN GOTO 2360
00953 IF (CK$='GANG') THEN GOTO 2800
00955 REM BEGIN INDIVIDUAL SUBPROGRAM
```

```
00960 G=99
00965 PRINT 'INPUT PAYGRADE AT RETIREMENT (E.G. E7, W3, 03E, 010).'
00970 INPUT PG$
00975 IF (PG$='E1') THEN G=1
00980 IF (PG$='E2') THEN G=2
00985 IF (PG$='E3') THEN G=3
00990 IF (PG$='E4') THEN G=4
00995 IF (PG$='E5') THEN G=5
01000 IF (PG$='E6') THEN G=6
01005 IF (PG$='E7') THEN G=7
01010 IF (PG$='E8') THEN G=8
01015 IF (PG$='E9') THEN G=9
01020 IF (PG$='W1') THEN G=10
01025 IF (PG$='W2') THEN G=11
01030 IF (PG$='W3') THEN G=12
01035 IF (PG$='W4') THEN G=13
01040 IF (PG$='01') THEN G=14
01045 IF (PG$='01E') THEN G=15
01050 IF (PG$='02') THEN G=16
01055 IF (PG$='02E') THEN G=17
01060 IF (PG$='03') THEN G=18
01065 IF (PG$='03E') THEN G=19
01070 IF (PG$='04') THEN G=20
01075 IF (PG$='05') THEN G=21
01080 IF (PG$='06') THEN G=22
01085 IF (PG$='07') THEN G=23
01090 IF (PG$='08') THEN G=24
01095 IF (PG$='09') THEN G=25
01100 IF (PG$='01C') THEN G=26
01105 IF (G=99) THEN GOTO 960
01110 PRINT 'INPUT YEAR OF SERVICE ENTRY (E.G. 1972).'
01115 INPUT YS
01120 IF YS<1776 THEN GOTO 1110
01125 PRINT USING 'AVERAGE LENGTH OF SERVICE FOR THIS PAYGRADE = ##.##';D(G)
01130 PRINT 'IS THIS ACCEPTABLE?  IF YES TYPE Y IF NO TYPE N.'
01135 INPUT LC$
01140 IF (LO$='Y') THEN LOS = D(G)
01145 IF (LO$='N') THEN GOTO 2080
01150 IF (LOS <20) THEN GOTO 2080
01155 IF (LOS<22) AND (LOS>=20) THEN L=1
01160 IF (LOS<24) AND (LOS>=22) THEN L=2
01165 IF (LOS<26) AND (LOS>=24) THEN L=3
01170 IF (LOS<28) AND (LOS>=26) THEN L=4
01175 IF (LOS<30) AND (LOS>=28) THEN L=5
01180 IF (LOS>=30) THEN L=6
01185 BP=P(G,L)
01190 CF=1983
01195 RF=LOS+YS
```

```
01200 PRINT USING 'PROJECTED RETIREMENT YEAR = ####';RF
01205 N=RF-CF
01210 PRINT 'SALARY SCALE INCREASE IS LOADED AS .055.'
01215 PRINT 'IS THIS ACCEPTABLE?  IF YES TYPE Y IF NO TYPE N.'
01220 INPUT SC$
01225 IF (SC$='N') THEN GOTO 2000
01230 IF (SC$='Y') THEN IN=.055
01235 PP=BP
01240 FOR I=1 TO N
01245 TP=PP*IN
01250 PP=TP+PP
01255 NEXT I
01260 PRINT USING 'CURRENT MONTHLY BASEPAY AT RETIREMENT GRADE =$#####.##';BP
01265 PRINT USING 'PROJECTED MONTHLY BASEPAY AT RETIREMENT GRADE =$#####.##';PP
01270 PRINT 'RETIREMENT IS CURRENTLY COMPUTED AT .025 OF BASEPAY.'
01275 PRINT 'IS THIS ACCEPTABLE?  IF YES TYPE Y IF NO TYPE N.'
01280 INPUT DL$
01285 IF (DL$='Y') THEN DL=.025
01290 IF (DL$='N') THEN GOTO 2220
01295 FAC =LOS * DL
01300 PRINT 'RETIREMENT CEILING IS CURRENTLY SET AT .75 OF BASE PAY.'
01305 PRINT 'IS THIS ACCEPTABLE?  IF YES TYPE Y IF NO TYPE N.'
01310 INPUT DM$
01315 IF (DM$='Y') THEN DM=.75
01320 IF (DM$='N') THEN GOTO 2250
01325 IF (FAC>DM) THEN FAC=DM
01330 IF (YS>1980) THEN GOTO 2030
01335 ANN=FAC*PP*12
01340 PRINT USING 'PROJECTED ANNUAL RETIREMENT PAY =$######.##';ANN
01345 PRINT 'ANNUAL DISCOUNT RATE IS LOADED AS .09.'
01350 PRINT 'IS THIS ACCEPTABLE?  IF YES TYPE Y IF NO TYPE N.'
01360 INPUT DX$
01365 IF (DX$='N') THEN GOTO 2095
01370 IF (DX$='Y') THEN DI=.09
01375 PRINT USING 'AVERAGE AGE AT RETIREMENT FOR THIS PAYGRADE =  ##.##';F(G)
01380 PRINT 'IS THIS ACCEPTABLE?  IF YES TYPE Y IF NO TYPE N.'
01385 INPUT GO$
01390 IF (GO$='Y') THEN AG=F(G)
01395 IF (GO$='N') THEN GOTO 2110
01400 IF (AG<36) THEN GOTO 2110
01405 IF (AG<37) AND (AG>=36) THEN Z=1
01410 IF (AG<38) AND (AG>=37) THEN Z=2
01415 IF (AG<39) AND (AG>=38) THEN Z=3
01420 IF (AG<40) AND (AG>=39) THEN Z=4
01425 IF (AG<41) AND (AG>=40) THEN Z=5
01430 IF (AG<42) AND (AG>=41) THEN Z=6
01435 IF (AG<43) AND (AG>=42) THEN Z=7
01440 IF (AG<44) AND (AG>=43) THEN Z=8
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01445 IF (AG<45) AND (AG>=44) THEN Z=9
01450 IF (AG<46) AND (AG>=45) THEN Z=10
01455 IF (AG<47) AND (AG>=46) THEN Z=11
01460 IF (AG<48) AND (AG>=47) THEN Z=12
01465 IF (AG<49) AND (AG>=48) THEN Z=13
01470 IF (AG<50) AND (AG>=49) THEN Z=14
01475 IF (AG<51) AND (AG>=50) THEN Z=15
01480 IF (AG<52) AND (AG>=51) THEN Z=16
01485 IF (AG<53) AND (AG>=52) THEN Z=17
01490 IF (AG<54) AND (AG>=53) THEN Z=18
01495 IF (AG<55) AND (AG>=54) THEN Z=19
01500 IF (AG<56) AND (AG>=55) THEN Z=20
01505 IF (AG<57) AND (AG>=56) THEN Z=21
01510 IF (AG<58) AND (AG>=57) THEN Z=22
01515 IF (AG<59) AND (AG>=58) THEN Z=23
01520 IF (AG<60) AND (AG>=59) THEN Z=24
01525 IF (AG<61) AND (AG>=60) THEN Z=25
01530 IF (AG<62) AND (AG>=61) THEN Z=27
01535 IF (AG<63) AND (AG>=62) THEN Z=28
01540 IF (AG<64) AND (AG>=63) THEN Z=29
01545 IF (AG<65) AND (AG>=64) THEN Z=30
01550 IF (AG>=65) THEN Z=31
01555 IF (G<=5) THEN LI=E(Z)
01560 IF (G>=10) THEN LI=OZ(Z)
01565 PRINT 'REMAINING LIFE EXPECTANCY FROM ACTUARIAL TABLES =';LI
01570 PRINT 'IS THIS ACCEPTABLE? IF YES TYPE Y IF NO TYPE N.'
01575 INPUT CH$
01580 IF (CH$='N') THEN GOTO 1985
01585 Q=(1+DI)**LI
01590 PRE=ANN*((1-(1/Q))/DI)
01595 PRINT USING 'PRESENT VALUE OF FUTURE RETIREMENT BENEFITS =$#######.##';PRE
01600 T=((1+DI)**LOS)-1
01605 NC=PRE*(DI/T)
01610 PRINT USING 'CURRENT YEAR INDIVIDUAL NORMAL COST =$######.##';NC
01615 PRINT'FIRST YEAR OF NORMAL COSTING?  IF YES TYPE Y IF NO TYPE N.'
01620 INPUT NC$
01625 IF (NC$ ='Y') THEN GOTO 2195
01630 PRINT 'DO YOU KNOW PREVIOUS YEAR NORMAL COST? IF YES TYPE Y IF NO TYPE N.'
01635 INPUT PN$
01640 IF (PN$='Y') THEN GOTO 2015
01645 PRINT USING 'SALARY SCALE % USED IN CURRENT YEAR NORMAL COST = .####';IN
01650 PRINT 'WAS THIS YOUR PRIOR YEAR ESTIMATOR?  IF YES TYPE Y IF NO TYPE N.'
01655 INPUT S$
01660 IF (S$='Y') THEN JN=IN
01665 IF (S$='N') THEN GOTO 2310
01670 H=G
01675 M=L
01680 QP=R(H,M)
```

```
01685 O=N+1
01690 XP=QP
01695 FOR J=1 TO C
01700 UP=XP*JA
01705 XP=UP+XP
01710 NEXT J
01715 IF (YS>1980) THEN GOTO 2265
01720 BNN=FAC*XP*12
01725 PRINT USING 'DISCOUNT RATE USED IN CURRENT YEAR NORMAL COST = .####';DI
01730 PRINT 'WAS THIS YOUR PRIOR YEAR ESTIMATOR?  IF YES TYPE Y IF NO TYPE N.'
01735 INPUT DR$
01740 IF (DR$='Y') THEN EI=DI
01745 IF (DR$='N') THEN GOTO 2325
01750 PRINT 'REMAINING LIFE EXPECTANCY USED IN CURRENT YEAR NORMAL COST =';LI
01755 PRINT 'WAS THIS YOUR PREVIOUS ESTIMATOR?  IF YES TYPE Y IF NO TYPE N.'
01760 INPUT DH$
01765 IF (DH$='Y') THEN MI=LI
01770 IF (DH$='N') THEN GOTO 2205
01775 S=(1+EI)**MI
01780 QRE=BNN*((1-(1/S))/EI)
01785 U=((1+EI)**LOS)-1
01790 OC=QRE*(EI/U)
01795 PRINT USING 'PREVIOUS YEAR INDIVIDUAL NORMAL COST=$######.##';OC
01800 FC=NC-OC
01805 PRINT
01810 PRINT USING 'CURRENT YEAR GAINS OR LOSSES  =$#####.##';FC
01815 PRINT 'ANY DEFERRED GAINS OR LOSSES?  IF YES TYPE Y IF NO TYPE N.'
01820 INPUT DG$
01825 IF (DG$='Y') THEN GOTO 2235
01830 IF (DG$='N') THEN GOSUB 2145
01835 V=N+1
01840 X=1/((1+DI)**V)
01845 AP=(FC+GL)*(DI/(1-X))
01850 PRINT USING 'APPLIED GAIN OR LOSS =$#####.##';AP
01855 RC=NC+AP
01860 IF (G<20) THEN PRO=.12
01865 IF (G>=20) THEN PRO=.4
01870 PRINT USING 'CURRENT YEAR INDIVIDUAL RETIREMENT COST =$#####.##';RC
01875 PRINT USING 'PROBABILITY OF NEW ENTRANT RETIRING = .####';PRO
01880 PRINT 'IS THIS ACCEPTABLE?  IF YES TYPE Y IF NO TYPE N.'
01885 INPUT PR$
01890 IF (PR$='N') THEN GOTO 1970
01895 PRINT USING'PROBABILITY OF ENTRANT RETIRING AT TARGET GRADE = .####';FZ(G)
01900 PRINT 'IS THIS ACCEPTABLE?  IF YES TYPE Y IF NO TYPE N.'
01905 INPUT FZ$
01910 IF (FZ$='Y') THEN TGT=FZ(G)
01915 IF (FZ$='N') THEN GOTO 2125
01920 IF (YS>1950) AND (YS<1983) THEN GOTO 2340
```

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01925 PRINT'INPUT NUMBER OF ENTRANTS IN INITIAL YEAR OF SERVICE (E.G. 230000).'
01930 INPUT NEW
01935 PEC=PRO*TGT*NEW
01940 PRINT USING 'TARGET POPULATION RETIRING ########';PEC
01945 TRC=PEC*RC
01950 PRINT 'PAYGRADE AT RETIREMENT = ';PG$
01955 PRINT 'YEAR OF SERVICE ENTRY = ';YS
01960 PRINT USING 'CURRENT TARGET GROUP RETIREMENT COST =$##########.##';TRC
01965 GOTO 5
01970 PRINT 'INPUT YOUR ESTIMATE OF RETIREMENT PROBABILITY (E.G. .3456).'
01975 INPUT PRO
01980 GOTO 1855
01985 PRINT 'INPUT YOUR ESTIMATE OF REMAINING LIFE EXPECTANCY (E.G. 39.41).'
01990 INPUT LI
01995 GOTO 1585
02000 PRINT 'INPUT SALARY SCALE INCREASE AS DECIMAL (E.G. .065).
02005 INPUT IN
02010 GOTO 1235
02015 PRINT 'INPUT PREVIOUS YEAR NORMAL COST (E.G. 1389.24).'
02020 INPUT OC
02025 GOTO 1800
02030 A=N-2
02035 RP=BP
02040 FOR K=1 TO A
02045 VP=RP*IN
02050 RP=VP+RP
02055 NEXT K
02060 SP=(IN*RP)+RP
02065 PP=(SP+RP+PF)/3
02070 PRINT USING 'RETIREMENT BASIS FOR POST 1980 ENTRANT =$######.##';PP
02075 GOTO 1335
02080 PRINT 'INPUT YOUR ESTIMATE LENGTH OF SERVICE AT RETIREMENT (E.G. 24.8).'
02085 INPUT LCS
02090 GOTO 1150
02095 PRINT 'INPUT DISCOUNT RATE ESTIMATE AS DECIMAL (E.G. .11).'
02100 INPUT DI
02105 GOTO 1375
02110 PRINT 'INPUT YOUR ESTIMATE OF AGE AT RETIREMENT (E.G. 47.86).'
02115 INPUT AG
02120 GOTO 1400
02125 PRINT 'INPUT YOUR PROBABILITY THAT ENTRANT RETIRES AT SELECTED TARGET'
02130 PRINT'RANK/GRADE (E.G. .235).
02135 INPUT TGT
02140 GOTO 1920
02145 PRINT
02150 PRINT'DEFERRED GAINS AND LOSSES ARE THE AMORTIZED VALUE OF DIFFERENCES'
02155 PRINT'CAUSED BY FLUCTUATIONS IN THE ESTIMATING VARIABLES OVER TIME.  THE'
02160 PRINT'ACTUARIAL MODEL DAMPENS THE IMPACT OF THESE FLUCTUATIONS TO A ZERO'
```

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02165 PRINT'AVERAGE OVER THE WORKING LIFE OF THE INDIVIDUAL.  THEREFORE, AN'
02170 PRINT'ENTRY OF ZERO FOR THIS VARIABLE DOES NOT INVALIDATE THE MODEL.'
02175 PRINT
02180 GL=0
02185 FD=0
02190 RETURN
02195 AP=0
02200 GOTO 1855
02205 PRINT 'INPUT YOUR ESTIMATE OF REMAINING LIFE EXPECTANCY (E.G. 42.1).'
02210 INPUT MI
02215 GOTO 1775
02220 PRINT 'INPUT DESIRED RETIREMENT RATE AS DECIMAL (E.G. .025).'
02225 INPUT DL
02230 GOTO 1255
02235 PRINT 'AMOUNT OF DEFERRED GAIN OR LOSS (E.G. 11.34).'
02240 INPUT GL
02245 GOTO 1835
02250 PRINT 'INPUT DESIRED RETIREMENT CEILING AS DECIMAL (E.G. .75).'
02255 INPUT DM
02260 GOTO 1325
02265 B=0-2
02270 YP=QP
02275 FOR C=1 TO B
02280 WP=YP*JN
02285 YP=WP+YP
02290 NEXT C
02295 ZP=(JN*YP)+YP
02300 XP=(YP+ZP+XP)/3
02305 GOTO 1720
02310 PRINT 'INPUT PRIOR YEAR SALARY SCALE & ESTIMATOR AS A DECIMAL (E.G. .06).'
02315 INPUT JN
02320 GOTO 1670
02325 PRINT 'INPUT PRIOR YEAR DISCOUNT RATE ESTIMATOR AS A DECIMAL (E.G. .09).'
02330 INPUT EI
02335 GOTO 1750
02340 IF (G>=20) THEN NEW=1000*OD(YS-1950)
02345 IF (G<20) THEN NEW=1000*ED(YS-1950)
02350 PRINT 'NUMBER OF REGULAR ENTRANTS IN INTIAL YEAR OF SERVICE =';NEW
02355 GOTO 1935
02360 PRINT 'YOU ARE NOW IN THE AGGREGATE METHOD PORTION OF THIS PROGRAM.'
02365 REM BEGIN AGGREGATE SUBPROGRAM
02370 PRINT'ALL DOLLAR AMOUNTS SHOULD BE INPUT AS MILLIONS (E.G. $12,332,223.24'
02375 PRINT 'SHOULD BE TYPED AS 12.332).
02380 PRINT
02385 PRINT 'WHAT IS THE PRESENT VALUE OF FUTURE BENEFITS?  (E.G. 4334.765).'
02390 INPUT PBE
02395 PRINT 'WHAT IS THE PRESENT VALUE OF FUTURE COMPENSATION? (E.G. 9127.585).'
02400 INPUT PCE
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02405 PF=PBE/PCE
02410 PRINT USING '#NORMAL COST PERCENTAGE FACTOR AS DECIMAL =#.####';PF
02415 PRINT 'IS THIS ACCEPTABLE?  IF YES TYPE Y IF NO TYPE N.'
02420 INPUT PF$
02425 IF (PF$='Y') THEN GOTO 2435
02430 IF (PF$='N') THEN GOTO 2605
02435 PRINT 'INPUT CURRENT FISCAL YEAR TOTAL BASE PAY (E.G. 27485.552).'
02440 INPUT TBF
02445 MC=PF*TBF
02450 PRINT USING '#CURRENT YEAR ACTIVE FORCE NORMAL COST =$######.###';MC
02455 PRINT 'FIRST YEAR OF NORMAL COSTING?  IF YES TYPE Y IF NO TYPE N.'
02460 INPUT AN$
02465 IF (AN$='Y') THEN GOTO 2650
02470 PRINT 'DO YOU KNOW PREVIOUS YEAR NORMAL COST? IF YES TYPE Y IF NO TYPE N.'
02475 INPUT SE$
02480 IF (SE$='N') THEN GOTO 2490
02485 IF (SE$='Y') THEN GOTO 2620
02490 PRINT 'INPUT PREVIOUS YEAR NORMAL COST % FACTOR AS A DECIMAL (E.G. .432).'
02495 INPUT QF
02500 PRINT 'INPUT PREVIOUS YEAR TOTAL BASE PAY (E.G. 22432.518).'
02505 INPUT UBF
02510 VC=QF*UBF
02515 PRINT USING '#PREVIOUS YEAR NORMAL COST =$######.###';VC
02520 WC=MC-VC
02525 PRINT USING '#CURRENT YEARS ACTUARIAL GAIN OR LOSS =$######.###';WC
02530 PRINT 'ANY DEFERRED GAIN OR LOSS?  IF YES TYPE Y IF NO TYPE N.'
02535 INPUT DG$
02540 IF (DG$='Y') THEN GOTO 2635
02545 IF (DG$='N') THEN GOSUB 2145
02550 PRINT 'INPUT DISCOUNT RATE AS DECIMAL (E.G. .112).'
02555 INPUT GI
02560 GIS=(1+GI)**20
02565 GIST=1/GIS
02570 HIST=1-GIST
02575 BLIP=GI/HIST
02580 FA=(WC+FD)*BLIP
02585 PRINT USING '#CURRENT YEAR GAINS/LOSSES APPLIED =$####.###';FA
02590 TRC=MC+FA
02595 PRINT USING '#CURRENT YEAR TOTAL RETIREMENT COST =$######.###';TRC
02600 GOTO 5
02605 PRINT 'INPUT OVERRIDE NORMAL COST % FACTOR AS DECIMAL (E.G. .553).'
02610 INPUT PF
02615 GOTO 2435
02620 PRINT 'INPUT PREVIOUS YEAR NORMAL COST (E.G. 4123.237).'
02625 INPUT VC
02630 GOTO 2520
02635 PRINT 'INPUT AMOUNT OF DEFERRED GAIN OR LOSS (E.G. 1213.456).'
02640 INPUT FD
```

```
02645 GOTO 2550
02650 FA=0
02655 GOTO 2590
02700 REM MULTIYEAR EXPANDED INDIVIDUAL NORMAL COST SUBPROGRAM
02800 PRINT 'YOU ARE NOW IN THE MULTIYEAR EXPANDED INDIVIDUAL NORMAL COST '
02805 PRINT 'PORTION OF THE PROGRAM.  NOTE THAT IN THIS SECTION AN ANSWER TO'
02810 PRINT 'AN ADJUSTMENT QUESTION OF 0 MEANS NO CHANGE.'
03000 PRINT 'INPUT DESIRED DISCOUNT RATE AS DECIMAL (E.G. .08).
03005 INPUT DI
03010 PRINT 'INPUT DESIRED RATE OF SALARY INCREASE AS DECIMAL (E.G. .055).
03015 INPUT IA
03020 PRINT 'INPUT DESIRED % RATE OF RETIRED PAY PER YEAR OF DUTY (E.G. .025)'
03025 INPUT DL
03030 PRINT 'INPUT DESIRED MAXIMUM % OF PAY BASIS AT RETIREMENT (E.G. .75).
03031 INPUT DM
03032 PRINT 'INPUT MINIMUM LOS REQUIRED TO RETIRE (E.G. 20).
03033 INPUT MRT
03040 PRINT 'INPUT ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY (E.G. -.02).
03045 INPUT PROP
03050 PRINT 'INPUT ADJUSTMENT TO LOS AND AGE AT RETIREMENT (E.G. -2).
03055 INPUT ADJ
03060 PRINT 'INPUT ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT (E.G. +3).
03065 INPUT LCNG
03066 PRINT'IF YOU WISH TO SEE ONLY SUMMARY TOTALS, TYPE SUM.'
03067 PRINT 'IF YOU WISH TO SEE FULL DETAIL, TYPE DETAIL.'
03068 INPUT C$
03069 DELT=1
03070 G=99
03075 TTTRC=0
03080 YS=1953
03085 PG$='E1'
03090 PRINT'*****************************************************************'
03095 TTRC=0
03100 IF (PG$='E1') THEN G=1
03105 IF (PG$='E2') THEN G=2
03110 IF (PG$='E3') THEN G=3
03115 IF (PG$='E4') THEN G=4
03120 IF (PG$='E5') THEN G=5
03125 IF (PG$='E6') THEN G=6
03130 IF (PG$='E7') THEN G=7
03135 IF (PG$='E8') THEN G=8
03140 IF (PG$='E9') THEN G=9
03145 IF (PG$='W1') THEN G=10
03150 IF (PG$='W2') THEN G=11
03155 IF (PG$='W3') THEN G=12
03160 IF (PG$='W4') THEN G=13
03165 IF (PG$='O1') THEN G=14
03170 IF (PG$='O1E') THEN G=15
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03175 IF (PG$='02') THEN G=16
03180 IF (PG$='02E') THEN G=17
03185 IF (PG$='03') THEN G=18
03190 IF (PG$='03E') THEN G=19
03195 IF (PG$='04') THEN G=20
03200 IF (PG$='05') THEN G=21
03205 IF (PG$='06') THEN G=22
03210 IF (PG$='07') THEN G=23
03215 IF (PG$='08') THEN G=24
03220 IF (PG$='09') THEN G=25
03225 IF (PG$='01C') THEN G=26
03230 IF (G=99) THEN GOTO 3070
03235 LOS=D(G)+ADJ
03240 IF (LOS<MRT) THEN LOS=MRT
03245 IF (LOS<22) AND (LOS>=20) THEN L=1
03250 IF (LOS<24) AND (LOS>=22) THEN L=2
03255 IF (LOS<26) AND (LOS>=24) THEN L=3
03260 IF (LOS<28) AND (LOS>=26) THEN L=4
03265 IF (LOS<30) AND (LOS>=28) THEN L=5
03270 IF (LOS>=30) THEN L=6
03275 BP=P(G,L)
03280 CF=1983
03285 RF=LOS+YS
03290 N=RF-CF
03295 PP=BP
03300 FOR I=1 TO N
03305 TP=PP*IN
03310 PP=TP+PP
03315 NEXT I
03320 FAC=LOS * CL
03325 IF (FAC>DM) THEN FAC=DM
03330 IF (YS>1980) THEN GOTO 3650
03335 ANN=FAC*PP*12
03340 IF (PG$='E1') THEN GOTO 3600
03345 IF (N<0) THEN GOTO 3710
03349 IF (D(G)+ADJ<MRT) AND (MRT>20) THEN GOTO 3706
03350 AG=F(G)+ADJ
03355 IF (AG<17+MRT) THEN AG=17+MRT
03360 IF (AG<37) AND (AG>=36) THEN Z=1
03365 IF (AG<38) AND (AG>=37) THEN Z=2
03370 IF (AG<39) AND (AG>=38) THEN Z=3
03375 IF (AG<40) AND (AG>=39) THEN Z=4
03380 IF (AG<41) AND (AG>=40) THEN Z=5
03385 IF (AG<42) AND (AG>=41) THEN Z=6
03390 IF (AG<43) AND (AG>=42) THEN Z=7
03395 IF (AG<44) AND (AG>=43) THEN Z=8
03400 IF (AG<45) AND (AG>=44) THEN Z=9
03405 IF (AG<46) AND (AG>=45) THEN Z=10
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03410 IF (AG<47) AND (AG>=46) THEN Z=11
03415 IF (AG<48) AND (AG>=47) THEN Z=12
03420 IF (AG<49) AND (AG>=48) THEN Z=13
03425 IF (AG<50) AND (AG>=49) THEN Z=14
03430 IF (AG<51) AND (AG>=50) THEN Z=15
03435 IF (AG<52) AND (AG>=51) THEN Z=16
03440 IF (AG<53) AND (AG>=52) THEN Z=17
03445 IF (AG<54) AND (AG>=53) THEN Z=18
03450 IF (AG<55) AND (AG>=54) THEN Z=19
03455 IF (AG<56) AND (AG>=55) THEN Z=20
03460 IF (AG<57) AND (AG>=56) THEN Z=21
03465 IF (AG<58) AND (AG>=57) THEN Z=22
03470 IF (AG<59) AND (AG>=58) THEN Z=23
03475 IF (AG<60) AND (AG>=59) THEN Z=24
03480 IF (AG<61) AND (AG>=60) THEN Z=25
03485 IF (AG<62) AND (AG>=61) THEN Z=27
03490 IF (AG<63) AND (AG>=62) THEN Z=28
03495 IF (AG<64) AND (AG>=63) THEN Z=29
03500 IF (AG<65) AND (AG>=64) THEN Z=30
03505 IF (AG>=65) THEN Z=31
03510 IF (G<=9) THEN LI=E(Z)
03515 IF (G>=10) THEN LI=OZ(Z)
03520 LI=LI+LONG
03525 Q=(1+DI)**LI
03530 PRE=ANN*((1-(1/Q))/DI)
03535 T=((1+DI)**LOS)-1
03540 NC=PRE*(DI/T)
03545 RC=NC
03550 IF (G<20) THEN PRO=.12
03555 IF (G>=20) THEN PRO=.4
03560 PRO=(PRO+PROP)*DELT
03562 DELT=1
03565 TGT=FZ(G)
03570 IF (YS>1950) AND (YS<1983) THEN GOTO 3695
03575 PEC=PRO*TGT*NEW
03580 TRC=PEC*RC
03585 TTRC=TTRC+TRC
03587 IF (C$='SUM') THEN GOTO 3595
03590 PRINT USING '##############',PG$;NC;TRC
03595 GOTO 3725
03600 PRINT 'YEAR OF ENTRY = ';YS
03601 IF (C$='SUM') THEN GOTO 3645
03605 PRINT 'DISCOUNT RATE =';DI
03610 PRINT 'SALARY SCALE ESTIMATOR = ';IN
03615 PRINT 'ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = ';PROP
03620 PRINT 'ADJUSTMENT TO LOS AND AGE AT RETIREMENT = ';ADJ
03625 PRINT 'ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = ';LONG
03630 PRINT 'RETIREMENT PAY BASIS PER YEAR OF SERVICE = ';DL
```

```
03635 PRINT 'RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = ';DM
03637 PRINT 'MINIMUM LOS FOR RETIREMENT = ';MRT
03640 PRINT 'PAYGRADE     NORMAL COST     TOTAL COST'
03645 GOTO 3345
03650 A=N-2
03655 RP=BP
03660 FOR K=1 TO A
03665 VP=RP*IN
03670 RP=VP+RP
03675 NEXT K
03680 SP=(IN*PP)+RP
03685 PP=(SP+RP+PP)/3
03690 GOTO 3335
03695 IF (G>=20) THEN NEW=1000*OD(YS-1950)
03700 IF (G<20) THEN NEW=1000*ED(YS-1950)
03705 GOTO 3575
03706 AG=F(G)+MRT-D(G)-ADJ
03707 DELT=.980**(MRT-D(G)-ADJ)
03709 GOTO 3355
03710 NC=0
03715 TRC=0
03720 GOTO 3585
03725 IF (PG$='01C') THEN GOTO 3845
03730 IF (PG$='09') THEN PG$='010'
03735 IF (PG$='08') THEN PG$='09'
03740 IF (PG$='07') THEN PG$='08'
03745 IF (PG$='06') THEN PG$='07'
03750 IF (PG$='05') THEN PG$='06'
03755 IF (PG$='04') THEN PG$='05'
03760 IF (PG$='03E') THEN PG$='04'
03765 IF (PG$='02E') THEN PG$='03E'
03770 IF (PG$='01E') THEN PG$='02E'
03775 IF (PG$='W4') THEN PG$='01E'
03780 IF (PG$='W3') THEN PG$='W4'
03785 IF (PG$='W2') THEN PG$='W3'
03790 IF (PG$='W1') THEN PG$='W2'
03795 IF (PG$='E9') THEN PG$='W1'
03800 IF (PG$='E8') THEN PG$='E9'
03805 IF (PG$='E7') THEN PG$='E8'
03810 IF (PG$='E6') THEN PG$='E7'
03815 IF (PG$='E5') THEN PG$='E6'
03820 IF (PG$='E4') THEN PG$='E5'
03825 IF (PG$='E3') THEN PG$='E4'
03830 IF (PG$='E2') THEN PG$='E3'
03835 IF (PG$='E1') THEN PG$='E2'
03840 GOTO 3100
03845 PRINT USING 'TOTAL YEAR GROUP COST =  $############';TTRC
03850 TTTRC=TTTRC+TTRC
```

```
03855 IF YS=1982 THEN GOTO 3870
03860 YS=YS+1
03865 GOTO 3085
03870 PRINT'**********************************************************'
03875 PRINT USING 'REGULAR NAVY COST = $##########.##';TTTRC
03880 PRINT'**********************************************************'
03885 GOTO 10
03890 END
```

APPENDIX B

ALTERNATIVE BASELINE LISTING

Annual Retirement Costs

Yr.	Selected Baseline	DOD Actuary
1953	$ .2M	$ .5M
1954	.3	.6
1955	3.3	7.2
1956	3.1	6.9
1957	5.0	11.0
1958	3.5	7.7
1959	12.7	26.7
1960	16.5	34.5
1961	17.2	35.9
1962	39.3	80.0
1963	34.5	70.4
1964	37.5	76.3
1965	41.3	84.1
1966	56.8	114.9
1967	51.7	105.6
1968	60.9	124.0
1969	72.6	147.4
1970	39.3	78.8
1971	48.4	98.8
1972	58.7	119.9
1973	56.5	114.3
1974	49.1	99.4
1975	55.8	112.9
1976	63.3	127.9
1977	69.3	139.9
1978	54.7	111.0
1979	58.7	119.4
1980	66.2	134.4
1981	71.1	144.4
1982	64.4	131.1
TRC	$1,211.9M	$2,466.3M

APPENDIX C

DETAILED SELECTED BASELINE

```
BEGIN RECORDING OF TERMINAL SESSION
R; T=0.01/0.02 15:11:34
WBASIC
YOU WILL BE LINKED TO THE BASIC VIRTUAL MACHINE AT VIRTUAL A
120 AND AT MODE 8 FOR THE DURATION OF YOUR BASIC SESSION.
***  WATERLOO BASIC  ***  V2.0
READY
OLD 'ENTRYAGE'
READY
RUN
EX-00 EXECUTION BEGINS...
**********************************************************
THIS IS A THREE PART INTERACTIVE PROGRAM.  IT CALCULATES IND
VIDUAL AND AGGREGATE MILITARY RETIREMENT COSTS.  AT THIS POI
PLEASE TYPE IN IND FOR THE INDIVIDUAL METHOD COST CALCULATIO
AGG FOR AGGREGRATE METHOD COST CALCULATIONS, OR GANG FOR EXP
MULTI YEAR INDIVIDUAL COST CALCULATIONS.  IF YOU WISH TO EXI
THE PROGRAM TYPE HALT.  PROGRAM LOADED DATA HAS BEEN DERIVED
DEPARTMENT OF DEFENSE SOURCES AND CONSIDERS 1983 TO BE THE C
YEAR.  PLEASE ENTER YOUR PROGRAM CHOICE AT THIS TIME.
**********************************************************
?
GANG
YOU ARE NOW IN THE MULTIYEAR EXPANDED INDIVIDUAL NORMAL COST
PORTION OF THE PROGRAM.  NOTE THAT IN THIS SECTION AN ANSWER
AN ADJUSTMENT QUESTION OF 0 MEANS NO CHANGE.
INPUT DESIRED DISCOUNT RATE AS DECIMAL (E.G. .08).
?
.09
INPUT DESIRED RATE OF SALARY INCREASE AS DECIMAL (E.G. .055)
?
.055
INPUT DESIRED % RATE OF RETIRED PAY PER YEAR OF DUTY (E.G. .
?
.025
INPUT DESIRED MAXIMUM % OF PAY BASIS AT RETIREMENT (E.G. .75
?
.75
INPUT MINIMUM LOS REQUIRED TO RETIRE (E.G. 20).
?
20
INPUT ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY (E.G. -.0
?
0
INPUT ADJUSTMENT TO LOS AND AGE AT RETIREMENT (E.G. -2).
?
0
INPUT ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT (E.G. +3).
?
0
IF YOU WISH TO SEE ONLY SUMMARY TOTALS, TYPE SUM.
IF YOU WISH TO SEE FULL DETAIL, TYPE DETAIL.
?
DETAIL
**********************************************************
YEAR OF ENTRY =  1983
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
     E1              C              0
     E2              C              0
```

```
      E3                0                0
      E4                0                0
      E5                0                0
      E6                0                0
      E7                0                0
      E8                0                0
      E9                0                0
      W1                0                0
      W2                0                0
      W3                0                0
      W4                0                0
      01E               0                0
      02E               0                0
      03E               0                0
      04                0                0
      05                0                0
      06                0                0
      07                0                0
      08             2924           192058
      09             2854            40754
      010            2815             8041
TOTAL YEAR GROUP COST =  $    240853
**********************************************************
YEAR OF ENTRY =  1954
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1                0                0
      E2                0                0
      E3                0                0
      E4                0                0
      E5                0                0
      E6                0                0
      E7                0                0
      E8                0                0
      E9                0                0
      W1                0                0
      W2                0                0
      W3                0                0
      W4                0                0
      01E               0                0
      02E               0                0
      03E               0                0
      04                0                0
      05                0                0
      06                0                0
      07             2992            27288
      08             3065           194107
      09             3011            41189
      010            2970             8127
TOTAL YEAR GROUP COST =  $    270711
**********************************************************
YEAR OF ENTRY =  1955
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
```

```
PAYGRADE     NORMAL COST     TOTAL COST
     E1                C              0
     E2                C              0
     E3                C              0
     E4                C              0
     E5                C              0
     E6                C              0
     E7                C              0
     E8                C              0
     E9                C              0
     W1                C              0
     W2                C              0
     W3                C              0
     W4                C              0
     O1E               C              0
     O2E               C              0
     O3E               C              0
     O4                C              0
     O5                C              0
     O6             3016        3025724
     O7             3157          24496
     O8             3254         174245
     O9             3177          36975
     O10            3134           7295
TOTAL YEAR GROUP COST =  $   3268735
**********************************************************
YEAR OF ENTRY =  1956
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
     E1                C              0
     E2                C              0
     E3                C              0
     E4                C              0
     E5                C              0
     E6                C              0
     E7                C              0
     E8                C              0
     E9                C              0
     W1                C              0
     W2                C              0
     W3                C              0
     W4                C              0
     O1E               C              0
     O2E               C              0
     O3E               C              0
     O4                C              0
     O5                C              0
     O6             3181        2895961
     O7             3330          23445
     O8             3423         166773
     O9             3351          35389
     O10            3306           6982
TOTAL YEAR GROUP COST =  $   3128550
**********************************************************
YEAR OF ENTRY =  1957
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
```

```
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1                C              0
      E2                C              0
      E3                C              0
      E4                C              0
      E5                C              0
      E6                C              0
      E7                C              0
      E8                C              0
      E9                C              0
      W1                C              0
      W2                C              0
      W3                C              0
      W4                C              0
     01E                C              0
     02E                C              0
     03E                C              0
      04                C              0
      05                C              0
      06             3356          4652296
      07             3513            37664
      08             3622           267916
      09             3536            56852
     010             3468            11217
TOTAL YEAR GROUP COST =  $  5025944
**********************************************************************
YEAR OF ENTRY =  1958
DISCOUNT RATE =  .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1                C              0
      E2                C              0
      E3                C              0
      E4                C              0
      E5                C              0
      E6                C              0
      E7                C              0
      E8                C              0
      E9                C              0
      W1                C              0
      W2                C              0
      W3                C              0
      W4                C              0
     01E                C              0
     02E                C              0
     03E                C              0
      04                C              0
      05                C              0
      06             3541          3259905
      07             3767            26391
      08             3861           187731
      09             3730            39836
     010             3660             7860
TOTAL YEAR GROUP COST =  $  3521724
**********************************************************************
YEAR OF ENTRY =  1959
DISCOUNT RATE =  .09
SALARY SCALE ESTIMATOR =  .055
```

```
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1              0              0
      E2              0              0
      E3              0              0
      E4              0              0
      E5              0              0
      E6              0              0
      E7              0              0
      E8              0              0
      E9           1937        1096514
      W1              0              0
      W2              0              0
      W3              0              0
      W4              0              0
     O1E              0              0
     O2E              0              0
     O3E           2356         615500
      O4           2657        3713331
      O5           3022        3549206
      O6           3736        3439200
      O7           3911          27843
      O8           4031         198057
      O9           3935          42027
     O10           3882           8292
TOTAL YEAR GROUP COST =  $  12689970
**********************************************************
YEAR OF ENTRY =  1960
DISCOUNT RATE =  .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1              0              0
      E2              0              0
      E3              0              0
      E4              0              0
      E5              0              0
      E6              0              0
      E7              0              0
      E8              0              0
      E9           2044        1223768
      W1              0              0
      W2              0              0
      W3           2158         241434
      W4              0              0
     O1E              0              0
     O2E              0              0
     O3E           2485         686931
      O4           2803        4841933
      O5           3188        4627925
      O6           3941        4484485
      O7           4126          36305
      O8           4253         258252
      O9           4152          54801
     O10           4096          10812
TOTAL YEAR GROUP COST =  $  16466648
**********************************************************
```

YEAR OF ENTRY = 1961
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR = .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT = 0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
MINIMUM LOS FOR RETIREMENT = 20

PAYGRADE	NORMAL COST	TOTAL COST
E1	0	0
E2	0	0
E3	0	0
E4	0	0
E5	0	0
E6	0	0
E7	0	0
E8	1879	2145662
E9	2156	1330627
W1	1827	103282
W2	1973	379054
W3	2277	262516
W4	2329	341147
O1E	0	0
O2E	2173	108104
O3E	2622	746914
O4	2957	3993715
O5	3364	3817197
O6	4158	3698885
O7	4353	29945
O8	4467	213011
O9	4360	45201
O10	4321	8918

TOTAL YEAR GROUP COST = $ 17224177

****

YEAR OF ENTRY = 1962
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR = .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT = 0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
MINIMUM LOS FOR RETIREMENT = 20

PAYGRADE	NORMAL COST	TOTAL COST
E1	0	0
E2	0	0
E3	0	0
E4	1037	170999
E5	1286	958302
E6	1516	5340549
E7	1655	9021371
E8	1983	2580876
E9	2274	1600523
W1	1928	124231
W2	2081	455939
W3	2402	315764
W4	2468	410343
O1E	1910	7385
O2E	2293	130032
O3E	2766	898413
O4	3120	5830127
O5	3549	5572442
O6	4387	5399727
O7	4552	43715
O8	4734	310959
O9	4621	65985

```
      010              4558              13019
TOTAL YEAR GROUP COST =   $   39250701
**********************************************************************
YEAR OF ENTRY =  1963
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1              682             698
      E2              779             797
      E3              899           21168
      E4             1094          143282
      E5             1357          802971
      E6             1599         4474898
      E7             1746         7559094
      E8             2092         2162541
      E9             2400         1341094
      W1             2034          104094
      W2             2195          382036
      W3             2534          264581
      W4             2604          343830
      01E            2015            6188
      02E            2419          108955
      03E            2918          752789
      04             3291         5427162
      05             3744         5187288
      06             4628         5026510
      07             4844           40693
      08             4994          289467
      09             4875           61425
      010            4809           12119
TOTAL YEAR GROUP COST =   $   34513680
**********************************************************************
YEAR OF ENTRY =  1964
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1              720             820
      E2              821             936
      E3              949           24872
      E4             1154          168352
      E5             1432          943467
      E6             1687         5257874
      E7             1842         8881714
      E8             2207         2540923
      E9             2532         1575746
      W1             2146          122307
      W2             2316          448881
      W3             2674          310875
      W4             2747          403991
      01E            2126            7270
      02E            2552          128019
      03E            3079          884505
      04             3472         5343946
      05             3950         5107749
      06             4862         4949437
```

```
      07              5111              40070
      08              5269             285028
      09              5143              60483
      010             5074              11933
TOTAL YEAR GROUP COST =  $  37499199
**************************************************
YEAR OF ENTRY =  1965
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1              759               859
      E2              867               981
      E3             1001             26047
      E4             1217            176303
      E5             1511            988024
      E6             1780           5506184
      E7             1944           9301105
      E8             2328           2660921
      E9             2671           1650163
      W1             2264            128084
      W2             2444            470080
      W3             2821            325557
      W4             2898            423070
      01E            2243              7614
      02E            2693            134065
      03E            3248            926277
      04             3663           6270684
      05             4167           5993527
      06             5151           5807760
      07             5362             47018
      08             5559            334457
      09             5426             70972
      010            5383             14003
TOTAL YEAR GROUP COST =  $  41263811
**************************************************
YEAR OF ENTRY =  1966
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1              801              1400
      E2              914              1598
      E3             1056             42457
      E4             1284            287382
      E5             1594           1610526
      E6             1878           8975342
      E7             2050          15161343
      E8             2456           4337428
      E9             2818           2689844
      W1             2388            208782
      W2             2578            766252
      W3             2976            530673
      W4             3058            689624
      01E            2366             12411
      02E            2841            218532
      03E            3427           1509876
```

```
      04              3865          6676265
      05              4356          6381181
      06              5434          6183400
      07              5669            50059
      08              5864           356090
      09              5724            75562
      010             5647            14908
TOTAL YEAR GROUP COST =  $  56780937
*****************************************************************
YEAR OF ENTRY =  1967
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1              845            1025
      E2              965            1170
      E3             1114           31081
      E4             1385          210379
      E5             1681         1178994
      E6             1981         6570449
      E7             2163        11098946
      E8             2551         3175239
      E9             2973         1969116
      W1             2520          152840
      W2             2720          560939
      W3             3139          388482
      W4             3226          504843
      01E            2486            9085
      02E            2957          159977
      03E            3615         1105313
      04             4077         8324088
      05             4638         7956173
      06             5723         7709575
      07             6061           62415
      08             6167          443979
      09             6039           94212
      010            5958           18588
TOTAL YEAR GROUP COST =  $  51726911
*****************************************************************
YEAR OF ENTRY =  1968
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1              852            1314
      E2             1018            1500
      E3             1175           39829
      E4             1429          269590
      E5             1774         1510815
      E6             2060         8419664
      E7             2282        14222679
      E8             2734         4068891
      E9             3126         2523312
      W1             2658          195856
      W2             2869          718812
      W3             3312          497818
      W4             3463          646928
```

```
      01E          2634          11643
      02E          3162         205002
      03E          3814        1416397
      04           4302        8849466
      05           4893        8458330
      06           6049        8196168
      07           6322          66354
      08           6527         472001
      09           6371         100158
      010          6285          19761
TOTAL YEAR GROUP COST =  $  60912287
**********************************************************
YEAR OF ENTRY =  1969
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1            941           1660
      E2           1074           1895
      E3           1240          50334
      E4           1508         340698
      E5           1871        1909318
      E6           2205       10640487
      E7           2408       17974142
      E8           2864        5142127
      E9           3309        3188876
      W1           2804         247517
      W2           3027         908411
      W3           3494         629126
      W4           3590         817566
      01E          2778          14713
      02E          3336         259075
      03E          4024        1789995
      04           4538        9692530
      05           5162        9264131
      06           6381        8976994
      07           6660          72676
      08           6886         516967
      09           6722         109700
      010          6631          21644
TOTAL YEAR GROUP COST =  $  72570581
**********************************************************
YEAR OF ENTRY =  1970
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1            992           1193
      E2           1123           1362
      E3           1308          36172
      E4           1591         244837
      E5           1974        1372100
      E6           2326        7646611
      E7           2540       12916822
      E8           3043        3695305
      E9           3491        2291634
      W1           2959         177874
```

W2	3154	652814
W3	3686	452111
W4	3788	587530
01E	2931	10574
02E	3519	186180
03E	4245	1286350
04	4788	2631593
05	5446	2515280
06	6732	2437320
07	7047	19732
08	7265	140360
09	7052	29784
010	6956	5876

TOTAL YEAR GROUP COST = $ 39339415

****

YEAR OF ENTRY = 1971
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR = .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT = 0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
MINIMUM LOS FOR RETIREMENT = 20

PAYGRADE	NORMAL COST	TOTAL COST
E1	1047	989
E2	1195	1128
E3	1380	29973
E4	1678	202879
E5	2063	1136960
E6	2454	6336194
E7	2660	10703237
E8	3210	3062033
E9	3683	1898911
W1	3121	147391
W2	3369	540940
W3	3889	374632
W4	3956	486844
01E	3092	8762
02E	3713	154274
03E	4479	1065906
04	5051	7535755
05	5746	7202683
06	7102	6979440
07	7435	56504
08	7665	401932
09	7482	85290
010	7381	16828

TOTAL YEAR GROUP COST = $ 48429482

****

YEAR OF ENTRY = 1972
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR = .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT = 0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
MINIMUM LOS FOR RETIREMENT = 20

PAYGRADE	NORMAL COST	TOTAL COST
E1	1104	1182
E2	1261	1349
E3	1456	35841
E4	1771	242594
E5	2197	1359527
E6	2589	7576543
E7	2827	12798460

```
      E8              3367          3661444
      E9              3865          2270634
      W1              3293           176244
      W2              3555           646832
      W3              4103           447968
      W4              4216           582146
      01E             3263            10477
      02E             3917           184474
      03E             4725          1274563
      04              5329          9289206
      05              6062          8878634
      06              7493          8603445
      07              7844            69652
      08              8086           495455
      09              7893           105135
      010             7766            20743
TOTAL YEAR GROUP COST =   $  58732548
*****************************************************************
YEAR OF ENTRY =  1973
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1              1165            1384
      E2              1330            1580
      E3              1536           41966
      E4              1868          284055
      E5              2318         1591881
      E6              2731         8871435
      E7              2963        14985820
      E8              3573         4287214
      E9              4059         2658704
      W1              3474          206365
      W2              3750          757381
      W3              4329          524530
      W4              4448          681640
      01E             3442           12267
      02E             4132          216002
      03E             4985         1492396
      04              5622         6709987
      05              6355         6413413
      06              7905         6214633
      07              8275           50312
      08              8531          357888
      09              8327           75944
      010             8215           14984
TOTAL YEAR GROUP COST =   $  56451781
*****************************************************************
YEAR OF ENTRY =  1974
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1              1269            1233
      E2              1463            1408
      E3              1620           37387
      E4              1971          253061
```

```
      E5            2446          1418189
      E6            2882          7903463
      E7            3147         13350701
      E8            3710          3819432
      E9            4324          2368610
      W1            3665           183849
      W2            3956           674743
      W3            4567           467298
      W4            4652           607266
      01E           3631            10929
      02E           4360           192434
      03E           5269          1329559
      04            5931          5588713
      05            6747          5341698
      06            8340          5176135
      07            8720            41905
      08            9000           298083
      09            8765            63253
      010           8667            12480
TOTAL YEAR GROUP COST =  $   49141825
*****************************************************************
YEAR OF ENTRY =  1975
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1            1297            1396
      E2            1460            1593
      E3            1709           42321
      E4            2079          286460
      E5            2580         1605361
      E6            3040         8946559
      E7            3320        15112722
      E8            3977         4323519
      E9            4562         2681218
      W1            3867          208113
      W2            4174          763795
      W3            4818          528971
      W4            4951          687412
      01E           3821           12371
      02E           4599          217831
      03E           5548         1505034
      04            6258         6387433
      05            7118         6105116
      06            8799         5915891
      07            9210           47894
      08            9495          340684
      09            9268           72293
      010           9143           14263
TOTAL YEAR GROUP COST =  $   55808251
*****************************************************************
YEAR OF ENTRY =  1976
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1            1368            1629
```

E2	1562	1859
E3	1803	49378
E4	2193	334223
E5	2722	1873028
E6	3207	10438251
E7	3503	17632520
E8	4196	5044394
E9	4813	3128267
W1	4060	242812
W2	4404	891145
W3	5063	617169
W4	5223	802027
01E	4042	14434
02E	4852	254151
03E	5854	1755974
04	6602	6842415
05	7509	6539988
06	9263	6337284
07	9717	51305
08	10017	364951
09	9778	77442
010	9646	15279

TOTAL YEAR GROUP COST = $ 63309925

****

YEAR OF ENTRY = 1977
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR = .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75
MINIMUM LOS FOR RETIREMENT = 20

PAYGRADE	NORMAL COST	TOTAL COST
E1	1443	1814
E2	1648	2070
E3	1903	54982
E4	2314	372155
E5	2872	2085604
E6	3384	11622919
E7	3695	19633686
E8	4426	5616898
E9	5078	3483304
W1	4304	270370
W2	4646	992284
W3	5362	687213
W4	5510	893051
01E	4264	16072
02E	5119	282995
03E	6176	1955264
04	6965	7218748
05	7922	6899687
06	9793	6685835
07	10251	54127
08	10568	385024
09	10316	81702
010	10177	16120

TOTAL YEAR GROUP COST = $ 69311921

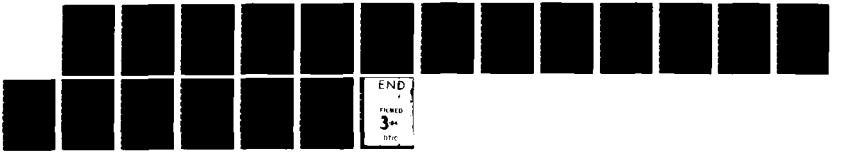
****

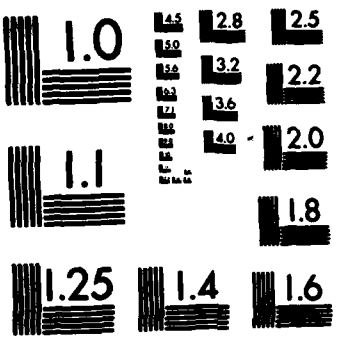
YEAR OF ENTRY = 1978
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR = .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY = 0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT = 0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT = 0
RETIREMENT PAY BASIS PER YEAR OF SERVICE = .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC = .75

```
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1            1523          1281
      E2            1738          1462
      E3            2007         38837
      E4            2441        262874
      E5            3020       1473179
      E6            3570       8209921
      E7            3858      13868377
      E8            4670       3967531
      E9            5357       2460453
      W1            4541        190977
      W2            4901        700906
      W3            5657        485417
      W4            5813        630812
     O1E            4459         11353
     O2E            5401        199895
     O3E            6515       1381113
      O4            7348       7038826
      O5            8358       6727718
      O6           10232       6519195
      O7           10615         52778
      O8           11150        375427
      O9           10683         79665
     O10           10736         15718
TOTAL YEAR GROUP COST =  $  54693717
*****************************************************************
YEAR OF ENTRY =  1979
DISCOUNT RATE =  .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1            1607          1265
      E2            1834          1444
      E3            2118         38342
      E4            2576        259529
      E5            3197       1454434
      E6            3766       8105453
      E7            4113      13691907
      E8            4927       3917045
      E9            5652       2429145
      W1            4790        188547
      W2            5171        691987
      W3            5969        479240
      W4            6133        622785
     O1E            4746         11208
     O2E            5698        197352
     O3E            6874       1363539
      O4            7752       8521595
      O5            8818       8144950
      O6           10900       7892501
      O7           11410         63896
      O8           11763        454513
      O9           11482         96447
     O10           11327         19029
TOTAL YEAR GROUP COST =  $  58646153
*****************************************************************
YEAR OF ENTRY =  1980
DISCOUNT RATE =  .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT =  0
```

AD-A138 210 A SENSITIVITY ANALYSIS OF ENTRY AGE NORMAL MILITARY RETIREMENT COSTS(U) NAVAL POSTGRADUATE SCHOOL MONTEREY CA D F SMITH SEP 83 2/2

UNCLASSIFIED F/G 15/5 NL





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ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =   0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1           1655           1528
      E2           1935           1743
      E3           2234          46309
      E4           2717         313454
      E5           3372        1756639
      E6           3973        9789620
      E7           4339       16536838
      E8           5168        4730937
      E9           5962        2933878
      W1           5054         227724
      W2           5455         835770
      W3           6297         578818
      W4           6470         752189
     O1E           5007          13537
     O2E           6011         238358
     O3E           7282        1646858
      O4           8178        8733417
      O5           9303        8347410
      O6          11500        8088686
      O7          12038          65484
      O8          12410         465811
      O9          12113          98845
     O10          11550          19502
TOTAL YEAR GROUP COST =  $  66223355
**********************************************************
YEAR OF ENTRY =  1981
DISCOUNT RATE = .09
SALARY SCALE ESTIMATOR =  .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =  0
ADJUSTMENT TO LCS AND AGE AT RETIREMENT =  0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =  0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =  .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =  .75
MINIMUM LOS FOR RETIREMENT =  20
PAYGRADE     NORMAL COST     TOTAL COST
      E1           1657           1610
      E2           1936           1838
      E3           2236          48823
      E4           2720         330465
      E5           3376        1851970
      E6           3977       10320893
      E7           4343       17434276
      E8           5203        4987680
      E9           5968        3093096
      W1           5059         240082
      W2           5460         881126
      W3           6303         610230
      W4           6476         793010
     O1E           5012          14272
     O2E           6017         251293
     O3E           7259        1736231
      O4           8166        9641652
      O5           9311        9215502
      O6          11511        8929872
      O7          12049          72294
      O8          12422         514253
      O9          12125         109124
     O10          11561          21530
TOTAL YEAR GROUP COST =  $  71101122
**********************************************************
YEAR OF ENTRY =  1982
DISCOUNT RATE = .09
```

```
SALARY SCALE ESTIMATOR =   .055
ADJUSTMENT TO ENTRANT RETIREMENT PROBABILITY =   0
ADJUSTMENT TO LOS AND AGE AT RETIREMENT =   0
ADJUSTMENT TO LIFE EXPECTANCY AT RETIREMENT =   0
RETIREMENT PAY BASIS PER YEAR OF SERVICE =   .025
RETIREMENT PAY CEILING AS PERCENTAGE OF BASIC =   .75
MINIMUM LOS FOR RETIREMENT =   20
PAYGRADE     NORMAL COST     TOTAL COST
      E1            1750           1373
      E2            2043           1567
      E3            2359          41610
      E4            2870         281645
      E5            3561        1578377
      E6            4156        8796180
      E7            4582       14858698
      E8            5469        4250846
      E9            6256        2636151
      W1            5327         204615
      W2            5761         750957
      W3            6649         520080
      W4            6823         675858
     O1E            5267          12163
     O2E            6348         214169
     O3E            7658        1479736
      O4            8636        9493813
      O5            9824        9074197
      O6           12144        8792947
      O7           12712          71186
      O8           13105         506368
      O9           12792         107451
     O10           12619          21200
TOTAL YEAR GROUP COST =  $   64371187
**********************************************************
REGULAR NAVY COST = $      1211916102
**********************************************************
**********************************************************
THIS IS A THREE PART INTERACTIVE PROGRAM.  IT CALCULATES IND
VIDUAL AND AGGREGATE MILITARY RETIREMENT COSTS.  AT THIS POI
PLEASE TYPE IN IND FOR THE INDIVIDUAL METHOD COST CALCULATIO
AGG FOR AGGREGRATE METHOD COST CALCULATIONS, OR GANG FOR EXP
MULTI YEAR INDIVIDUAL COST CALCULATIONS.  IF YOU WISH TO EXI
THE PROGRAM TYPE HALT.  PROGRAM LOADED DATA HAS BEEN DERIVED
DEPARTMENT OF DEFENSE SOURCES AND CONSIDERS 1983 TO BE THE C
YEAR.  PLEASE ENTER YOUR PROGRAM CHOICE AT THIS TIME.
**********************************************************
?
HALT
EX-01 ...EXECUTION ENDS
READY
BYE
R; T=7.65/9.83 15:14:41
RECORD OFF
END RECORDING OF TERMINAL SESSION
```

APPENDIX D

DISCOUNT RATE LISTING

Annual Retirement Costs

(Baseline = 9%)

Yr	5%	0%	7%	8%	9%	10%
1953	$ .7M	$ .5M	$ .4M	$ .3M	$ .2M	$ .2M
1954	.8	.6	.5	.4	.3	.2
1955	9.3	7.2	5.5	4.2	3.3	2.5
1956	8.9	6.9	5.3	4.1	3.1	2.4
1957	14.4	11.0	8.5	6.5	5.0	3.9
1958	10.1	7.7	5.9	4.6	3.5	2.7
1959	34.6	26.7	20.8	16.2	12.7	10.0
1960	44.9	34.5	27.0	21.0	16.5	12.9
1961	46.3	35.9	28.0	21.9	17.2	13.6
1962	102.4	80.0	62.8	49.5	39.3	31.2
1963	90.2	70.4	55.3	43.6	34.5	27.5
1964	97.7	76.3	59.9	47.3	37.5	29.9
1965	107.7	84.1	66.0	52.1	41.3	32.8
1966	146.9	114.9	90.4	71.5	56.8	45.3
1967	135.3	105.6	82.9	65.3	51.7	41.1
1968	158.7	124.0	97.4	76.8	60.9	48.5
1969	188.5	147.4	115.8	91.5	72.6	57.8
1970	100.5	78.8	62.2	49.3	39.3	31.5
1971	126.5	98.8	77.5	61.1	48.4	38.5
1972	153.6	119.9	94.1	74.1	58.7	46.7
1973	146.1	114.3	89.9	71.1	56.5	45.0
1974	127.0	99.4	78.2	61.9	49.1	39.2
1975	144.3	112.9	88.8	70.2	55.8	44.5
1976	163.4	127.9	100.7	79.7	63.3	50.5
1977	178.7	139.9	110.2	87.2	69.3	55.4
1978	141.9	111.0	87.2	68.9	54.7	43.6
1979	152.8	119.4	93.7	74.0	58.7	46.7
1980	172.0	134.4	105.7	83.5	66.2	52.8
1981	184.8	144.4	113.5	89.6	71.1	56.6
1982	167.8	131.1	102.9	81.2	64.4	51.2
TRC	$3,156.9M	$2,466.3M	$1,936.6M	$1,528.6M	$1,211.9M	$965.0M

APPENDIX D (Continued)

DISCOUNT RATE LISTING

Annual Retirement Costs

(Baseline = 9%)

Yr	11%	12%	13%	14%	15%
1953	$ .1M	$ .1M	$ .1M	$ .1M	$ .1M
1954	.2	.1	.1	.1	.1
1955	2.0	1.5	1.2	.9	.7
1956	1.9	1.5	1.1	.9	.7
1957	3.0	2.3	1.8	1.4	1.1
1958	2.1	1.6	1.3	1.0	.7
1959	7.9	6.2	4.9	3.9	3.1
1960	10.2	8.1	6.4	5.1	4.1
1961	10.8	8.5	6.8	5.4	4.4
1962	25.0	20.0	16.1	13.0	1.1
1963	21.9	17.6	14.1	11.4	9.2
1964	23.9	19.2	15.4	12.5	10.1
1965	26.2	21.0	16.9	13.7	11.1
1966	36.3	29.2	23.5	19.1	15.5
1967	32.8	26.3	21.1	17.1	13.8
1968	38.8	31.1	25.0	20.2	16.4
1969	46.3	37.2	30.0	24.2	19.6
1970	25.3	20.4	16.6	13.5	11.0
1971	30.8	24.7	19.9	16.0	13.0
1972	37.3	29.9	24.1	19.4	15.7
1973	36.1	29.0	23.4	18.9	15.4
1974	31.4	25.3	20.4	16.5	13.4
1975	35.7	28.7	23.2	18.8	15.2
1976	40.5	32.6	26.3	21.3	17.3
1977	44.4	35.7	28.9	23.4	19.0
1978	34.9	28.0	22.6	18.3	14.8
1979	37.3	30.0	24.1	19.5	15.8
1980	42.2	33.9	27.3	22.1	17.9
1981	45.3	36.4	29.3	23.7	19.2
1982	41.0	32.9	26.5	21.4	17.3
TRC	$771.5M	$619.1M	$498.6M	$402.9M	$326.6M

APPENDIX E

SALARY INCREASE LISTING

Annual Retirement Costs

(Baseline = 5.5%)

Yr	2.5%	3.0%	3.5%	4.0%	4.5%	5.0%
1953	$ .2M	$ .2M	$ .2M	$ .2M	$ .2M	$ .2M
1954	.3	.3	.3	.3	.3	.3
1955	3.3	3.3	3.3	3.3	3.3	3.3
1956	3.0	3.0	3.1	3.1	3.1	3.1
1957	4.7	4.8	4.8	4.9	4.9	5.0
1958	3.2	3.3	3.3	3.4	3.4	34.7
1959	12.3	12.3	12.4	12.5	12.5	12.6
1960	15.5	15.6	15.8	16.0	16.1	16.3
1961	16.0	16.2	16.4	16.6	16.8	17.0
1962	36.9	37.3	37.6	38.0	38.4	38.8
1963	31.4	31.9	32.4	32.9	33.4	34.0
1964	33.3	34.0	34.7	35.3	36.1	36.8
1965	35.5	36.4	37.3	38.3	39.3	40.2
1966	48.0	49.4	50.8	52.2	53.7	55.2
1967	41.9	43.4	45.0	46.6	48.2	49.9
1968	48.2	50.1	52.1	54.2	56.4	58.6
1969	56.0	58.5	61.1	63.8	66.6	69.5
1970	30.1	31.5	32.9	34.4	36.0	37.6
1971	35.0	37.0	39.0	41.2	43.5	45.9
1972	41.2	43.8	46.4	49.2	52.2	55.4
1973	39.0	41.5	44.1	47.0	49.9	53.1
1974	33.0	35.3	37.7	40.3	43.1	46.0
1975	36.4	39.2	42.0	45.1	48.5	52.0
1976	40.3	43.4	46.9	50.5	54.5	58.7
1977	42.9	46.5	50.4	54.6	59.1	64.0
1978	32.6	35.6	38.8	42.3	46.1	50.2
1979	33.8	37.1	40.7	44.6	48.9	53.5
1980	37.2	41.0	45.2	49.7	54.7	60.2
1981	39.9	44.0	48.4	53.3	58.7	64.6
1982	35.0	38.7	43.0	47.5	52.6	58.2
TRC	$866.3M	$914.5M	$966.1M	$1,021.3M	$1,080.6M	$1,143.9M

APPENDIX E (Continued)

SALARY INCREASE LISTING

Annual Retirement Costs

(Baseline - 5.5%)

Yr	5.5%	6.0%	6.5%	7.0%	7.5%
1953	$ .2M	$ .2M	$ .2M	$ .2M	$ .2M
1954	.3	.3	.3	.3	.3
1955	3.3	3.3	3.3	3.3	3.3
1956	3.1	3.1	3.2	3.2	3.2
1957	5.0	5.1	5.1	5.2	5.2
1958	3.5	3.6	3.6	3.7	3.7
1959	12.7	12.8	12.8	12.9	13.0
1960	16.5	16.6	16.8	17.0	17.2
1961	17.2	17.4	17.7	17.9	18.1
1962	39.3	39.7	40.1	40.5	41.0
1963	34.5	35.1	35.6	36.2	36.8
1964	37.5	38.2	39.0	39.8	40.6
1965	41.3	42.3	43.4	44.5	45.6
1966	56.8	58.4	60.0	61.8	63.5
1967	51.7	53.6	55.5	57.4	59.5
1968	60.9	63.3	65.8	68.4	71.1
1969	72.6	75.8	79.1	82.5	86.1
1970	39.3	41.1	43.0	44.9	46.9
1971	48.4	51.1	53.9	56.9	60.0
1972	58.7	62.3	66.0	70.0	74.1
1973	56.5	60.0	63.8	67.8	72.0
1974	49.1	52.5	56.0	59.8	63.8
1975	55.8	59.9	64.2	68.9	73.8
1976	63.3	68.2	73.5	79.1	85.2
1977	69.3	75.0	81.2	87.9	95.0
1978	54.7	59.6	64.8	70.6	76.8
1979	58.7	64.2	70.3	76.9	84.2
1980	66.2	72.8	80.0	87.9	96.6
1981	71.1	78.2	86.0	94.5	103.9
1982	64.4	71.2	78.7	87.0	96.1
TRC	$1,211.9M	$1,284.9M	$1,362.9M	$1,446.7M	$1,536.6M

APPENDIX F

LENGTH OF SERVICE LISTING

Annual Retirement Costs

(Baseline = 0)

Yr	-3 Yrs	-2 Yrs	-1 Yr	0	+1 Yr	+2 Yrs	+3 Yrs
1953	$ 0.0M	$ 0.0M	$ 0.0M	$ .2M	$ .3M	$ 3.5M	$ 3.3M
1954	0.0	0.0	.3	.3	3.6	3.5	3.4
1955	0.0	.2	.3	3.3	3.3	3.2	3.0
1956	.2	.2	3.2	3.1	3.1	3.0	10.2
1957	.4	5.2	5.1	5.0	4.9	14.5	14.2
1958	3.4	3.6	3.6	3.5	12.0	12.1	14.3
1959	3.6	3.8	3.8	12.7	12.8	15.2	25.7
1960	4.7	5.0	16.4	16.5	19.1	31.1	30.7
1961	3.8	14.1	14.2	17.2	30.3	30.2	29.8
1962	19.5	20.4	23.8	39.3	39.5	39.3	38.7
1963	34.9	35.2	34.7	34.5	34.7	34.5	33.9
1964	38.0	38.3	37.6	37.5	37.8	37.5	37.0
1965	41.7	42.1	41.4	41.3	41.5	41.2	40.6
1966	57.7	58.0	57.0	56.8	57.3	57.0	56.2
1967	52.3	52.8	52.0	51.7	52.0	51.6	50.8
1968	61.7	62.2	61.2	60.9	61.3	60.9	60.0
1969	73.6	74.1	72.8	72.6	73.1	72.7	71.7
1970	40.2	40.2	39.4	39.3	39.9	39.7	39.3
1971	49.0	49.4	48.6	48.4	48.7	48.4	47.6
1972	59.4	60.0	59.0	58.7	59.0	58.7	57.8
1973	57.3	57.6	56.6	56.5	57.0	56.7	55.9
1974	49.9	50.2	49.3	49.1	49.6	49.3	48.7
1975	56.7	57.0	56.0	55.8	56.3	56.0	55.3
1976	64.4	64.7	63.5	63.3	63.9	63.6	62.8
1977	70.5	70.8	69.5	69.3	70.0	69.7	68.8
1978	55.5	55.8	54.9	54.7	55.2	54.8	54.1
1979	59.4	59.9	58.9	58.7	59.0	58.7	57.8
1980	67.1	67.6	66.5	66.2	66.7	66.4	65.4
1981	72.1	72.6	71.4	71.1	71.6	71.2	70.2
1982	65.2	65.7	64.6	64.4	64.7	64.4	63.4
TRC	$1,162.0M	$1,186.8M	$1,185.4M	$1,211.9M	$1,248.1M	$1,268.6M	$1,270.4M

APPENDIX G

MORTALITY TABLES

	American Experience (1843-1858)		Commissioners 1958 Standard Ordinary (1958-1954)		Individual Annuity Table for 1971—Male (1969-1967)		Individual Annuity Table for 1971—Female (1969-1967)		United States Total Population (1969-1971)	
Age	Deaths Per 1,000	Expectation of Life (Years)	Deaths Per 1,000	Expectation of Life (Years)	Deaths Per 1,000	Expectation of Life (Years)	Deaths Per 1,000	Expectation of Life (Years)	Deaths Per 1,000	Expectation of Life (Years)
0	154.70	41.46	7 08	68.30	—	—	—	—	20 02	70 75
1	63.49	47.94	1.76	67 78	—	—	—	—	1 25	71 19
2	35.50	50.16	1.52	66.90	—	—	—	—	86	70 28
3	23.91	50.96	1.46	66 00	—	—	—	—	69	69 34
4	17.70	51.22	1.40	65.10	—	—	—	—	.57	68 39
5	13.60	51.13	1.35	64.19	.46	71.69	23	76 99	.51	67 43
6	11.37	50.83	1.30	63.27	.42	70.73	19	76.01	.46	66.46
7	9.75	50.41	1 26	62.36	.40	69 75	.16	75.02	43	65 49
8	8.63	49.90	1.23	61.43	.39	68.78	.14	74.03	.39	64 52
9	7.89	49.33	1 21	60.51	.39	67.81	13	73.04	.34	63 54
10	7.49	48.72	1.21	59.58	.39	66.84	.13	72 05	.31	62 57
11	7.52	48.09	1.23	58.65	.40	65 88	.14	71 08	30	61 58
12	7.54	47.45	1.26	57.72	.41	64.89	.16	70 07	.35	60 60
13	7.57	46.80	1.32	56.80	.41	63.91	.17	69.08	.46	59.62
14	7.60	46.16	1.39	55.87	.42	62.94	.18	68 10	.63	58 65
15	7.63	45.50	1.46	54.95	.43	61 97	.19	67.11	.82	57 69
16	7.68	44.85	1.54	54.03	.44	60.99	.21	66.12	1.01	56.73
17	7.69	44.19	1.62	53.11	.46	60.02	.22	65.13	1.17	55.79
18	7.73	43.53	1 68	52.19	.47	59.05	.23	64.15	1.28	54 88
19	7.77	42.87	1 74	51.28	.49	58.07	.25	63.16	1 34	53 93
20	7.80	42.20	1.79	50.37	.50	57.10	.26	62.18	1.40	53 00
21	7.86	41.53	1.83	49.46	.52	56.13	.28	61.19	1.47	52.07
22	7.91	40.86	1 86	48.56	.54	55.16	.29	60.21	1.52	51.15
23	7.96	40.17	1.89	47.64	.57	54.19	.31	59.23	1.53	50.22
24	8.01	39.49	1.91	46.73	.58	53 22	.33	58.25	1.51	49.30
25	8.06	38.81	1.93	45.82	.62	52.25	.35	57.27	1.47	48.37
26	8.13	38.12	1.95	44.90	.65	51 28	.37	56.29	1.43	47.44
27	8.20	37.43	1.99	43.99	.68	50 32	.39	56 31	1.42	46.51
28	8.28	36.73	2.03	43.08	.72	49.35	.41	54.33	1 44	45.58
29	8.34	36.03	2.08	42.16	.76	48.39	.44	53 35	1 49	44.64
30	8.43	35.33	2.13	41.25	.81	47 42	.47	52.37	1.55	43.71
31	8.51	34.63	2.19	40.34	.86	46 46	.50	51.40	1.63	42.77
32	8.61	33.92	2.25	39 43	.92	45.50	.53	50.42	1 72	41 84
33	8.72	33.21	2.32	38.51	.98	44.54	.57	49.45	1.83	40.92
34	8.83	32.50	2.40	37.60	1.05	43.58	.61	48.48	1.95	39 99
35	8.95	31.78	2.51	36 69	1.12	42.63	65	47.51	2.09	39 07
36	9.09	31.07	2.64	35.78	1.20	41.68	.70	46 54	2.25	38 15
37	9.23	30.36	2.80	34.88	1.30	40.73	.75	45 57	2.44	37.23
38	9.41	29.62	3.01	33.97	1.40	39.78	.81	44 60	2.66	36.32
39	9.59	28.89	3 25	33.07	1.51	38 83	.87	43.64	2.90	35 42
40	9.79	28.16	3.53	32.18	1.63	37.89	.94	42 69	3.14	34.52
41	10.01	27.46	3.84	31.29	1.79	36 95	1.01	41 72	3 41	33 63
42	10.25	26.72	4.17	30.41	2.00	36.02	1 09	40.76	3.70	32.74
43	10.52	26.00	4 53	29.54	2 26	35 09	1.19	39.80	4.04	31 86
44	10.83	25.27	4.92	28.67	2.57	34.17	1.29	38.85	4 43	30.99
45	11.16	24.54	5.35	27.81	2.92	33.25	1.40	37.90	4 84	30.12
46	11.56	23.81	5.83	26.95	3.32	32.35	1 52	36 95	5 28	29.27
47	12.00	23.08	6.36	26.11	3.75	31.46	1 65	36 01	5.74	28.42
48	12.51	22.36	6.95	25.27	4.23	30.57	1 80	35.06	6.24	27 58
49	13.11	21.63	7.60	24.46	4 74	29.70	1 97	34.13	6.78	26 75
50	13.78	20.91	8.32	23.63	5.29	28 84	2 15	33 19	7 38	25 93
51	14.54	20.20	9.11	22 82	5.88	27.99	2 37	32.26	8.04	25.12
52	15.39	19.49	9.98	22 03	6.46	27 15	2 64	31 34	8.76	24 32
53	16.33	18.79	10.89	21 25	7.09	26.33	2 97	30.42	9 57	23.53
54	17 40	18.09	11 90	20.47	7.74	25.51	3 35	29 51	10.43	22 75
55	18.57	17.40	13.00	19.71	8.42	24.71	3.79	28 61	11 36	21 99
56	19.89	16.72	14.21	18.97	9.12	23 91	4 28	27 71	12 36	21 23

APPENDIX G (Continued)

MORTALITY TABLES

Age	American Experience (1843-1858) Deaths Per 1,000	American Experience (1843-1858) Expectation of Life (Years)	Commissioners 1958 Standard Ordinary (1950-1954) Deaths Per 1,000	Commissioners 1958 Standard Ordinary (1950-1954) Expectation of Life (Years)	Individual Annuity Table for 1971—Male (1960-1967) Deaths Per 1,000	Individual Annuity Table for 1971—Male (1960-1967) Expectation of Life (Years)	Individual Annuity Table for 1971—Female (1960-1967) Deaths Per 1,000	Individual Annuity Table for 1971—Female (1960-1967) Expectation of Life (Years)	United States Total Population (1969-1971) Deaths Per 1,000	United States Total Population (1969-1971) Expectation of Life (Years)
57	21.34	16.05	15.54	18.23	9.85	23.13	4.83	26.83	13.41	20.49
58	22.94	15.39	17.00	17.51	10.61	22.35	5.41	25.96	14.52	19.76
59	24.72	14.74	18.59	16.81	11.41	21.59	6.02	25.10	15.70	19.05
60	26.69	14.10	20.34	16.12	12.25	20.83	6.63	24.25	16.95	18.34
61	28.88	13.47	22.24	15.44	13.13	20.08	7.22	23.41	18.29	17.65
62	31.29	12.86	24.31	14.78	14.07	19.34	7.77	22.57	19.74	16.97
63	33.94	12.26	26.57	14.14	15.08	18.61	8.29	21.74	21.33	16.30
64	36.87	11.67	29.04	13.51	16.19	17.89	8.78	20.92	23.06	15.65
65	40.13	11.10	31.75	12.90	17.41	17.17	9.29	20.10	24.95	15.00
66	43.71	10.54	34.74	12.31	18.77	16.47	9.89	19.29	26.99	14.38
67	47.65	10.00	38.04	11.73	20.29	15.77	10.62	18.47	29.18	13.76
68	52.00	9.47	41.66	11.17	21.98	15.09	11.54	17.67	31.52	13.16
69	56.76	8.97	45.61	10.64	23.89	14.42	12.66	16.87	34.00	12.57
70	61.99	8.48	49.79	10.12	26.00	13.76	14.03	16.08	36.61	12.00
71	67.67	8.00	54.15	9.63	28.34	13.11	15.65	15.30	39.43	11.43
72	73.73	7.55	58.65	9.15	30.93	12.48	17.55	14.53	42.66	10.88
73	80.18	7.11	63.26	8.69	33.80	11.86	19.74	13.79	46.44	10.34
74	87.03	6.68	68.12	8.24	36.98	11.26	22.26	13.05	50.75	9.82
75	94.37	6.27	73.37	7.81	40.49	10.67	25.12	12.34	55.52	9.32
76	102.31	5.88	79.18	7.39	44.39	10.10	28.37	11.64	60.60	8.84
77	111.08	5.49	85.70	6.98	48.72	9.55	32.06	10.97	65.96	8.38
78	120.83	5.11	93.06	6.59	53.50	9.01	36.23	10.32	71.53	7.93
79	131.73	4.74	101.19	6.21	58.79	8.50	40.98	9.68	77.41	7.51
80	144.47	4.39	109.98	5.85	64.60	7.99	46.39	9.08	83.94	7.10
81	158.80	4.05	119.36	5.51	70.90	7.51	52.51	8.49	91.22	6.70
82	174.30	3.71	129.17	5.19	77.67	7.05	59.41	7.94	98.92	6.32
83	191.56	3.39	139.38	4.89	84.94	6.60	67.16	7.41	106.95	5.96
84	211.36	3.08	150.01	4.60	92.87	6.16	75.90	6.90	115.48	5.62
85	236.55	2.77	161.14	4.32	101.69	5.74	85.77	6.43	125.61	5.28
86	265.69	2.47	172.82	4.06	111.65	5.34	96.90	5.99	137.48	4.97
87	300.02	2.18	185.13	3.80	123.05	4.95	109.34	5.57	149.79	4.68
88	340.69	1.91	198.25	3.55	136.12	4.57	122.98	5.20	161.58	4.42
89	386.86	1.66	212.46	3.31	151.07	4.21	137.51	4.86	172.92	4.18
90	454.55	1.42	228.14	3.08	168.04	3.87	152.47	4.55	185.02	3.94
91	532.47	1.19	245.77	2.82	187.15	3.55	167.37	4.28	198.88	3.73
92	634.26	.98	265.93	2.58	208.46	3.26	181.78	4.04	213.63	3.53
93	734.18	.80	289.30	2.33	231.89	2.98	195.39	3.83	228.70	3.35
94	857.14	.64	316.66	2.07	257.15	2.73	208.07	3.63	243.36	3.19
95	1,000.00	.50	351.24	1.80	283.84	2.50	219.90	3.46	257.45	3.06
96			400.56	1.51	311.57	2.30	231.10	3.29	269.59	2.95
97			466.42	1.18	340.21	2.11	242.21	3.13	280.24	2.85
98			666.15	.83	369.77	1.94	253.82	2.97	289.77	2.76
99			1,000.00	.50	400.19	1.79	266.45	2.81	298.69	2.69
100					431.41	1.65	280.54	2.65	306.96	2.62
101					463.31	1.53	296.45	2.49	314.61	2.56
102					495.76	1.41	314.54	2.33	321.67	2.51
103					528.60	1.31	335.12	2.17	328.17	2.46
104					561.69	1.21	358.54	2.01	334.14	2.41
105					594.88	1.13	385.12	1.85	339.60	2.37
106					628.02	1.05	415.24	1.70	344.60	2.34
107					660.95	.98	448.27	1.55	349.17	2.30
108					693.50	.92	487.65	1.41	353.33	2.27
109					725.52	.86	530.79	1.27	357.12	2.24

Note: Mortality rates contained in the 1958 Commissioners Standard Ordinary Table were obtained from experience of 1950-1954, but contain an added element designed to generate life insurance reserves of a conservative nature in keeping with the long-term guarantees inherent in life insurance contracts. Premiums for life insurance policies, on the other hand, are based on assumptions that include expected mortality experience.

Mortality rates for the 1971 Annuity Tables are, again, conservative as related to the actual experience upon which they are based.

APPENDIX H

LIFE EXPECTANCY LISTING

Annual Retirement Costs

(Baseline = 0)

Yr	0	+1 Yr	+2 Yrs	+3 Yrs	+4 Yrs	+5 Yrs
1953	$ .2M	$ .2M	$ .2M	$ .2M	$ .3M	$ .3M
1954	.3	.3	.3	.3	.3	.3
1955	3.3	3.3	3.3	3.3	3.4	3.4
1956	3.1	3.6	3.2	3.2	3.2	3.2
1957	5.0	5.1	5.1	5.1	5.2	5.2
1958	3.5	3.6	3.6	3.6	3.6	3.6
1959	12.7	12.8	I2.8	12.9	13.0	13.0
1960	16.5	16.6	16.7	16.7	16.8	16.9
1961	17.2	17.3	17.4	17.5	17.6	17.7
1962	39.3	39.4	39.7	39.8	40.0	40.2
1963	34.5	34.7	34.9	35.0	35.2	35.3
1964	37.5	37.7	37.9	38.1	38.2	38.4
1965	41.3	41.5	41.7	41.9	42.1	42.2
1966	56.8	57.1	57.4	57.6	57.9	58.1
1967	51.7	52.0	52.3	52.5	52.7	52.9
1968	60.9	61.2	61.6	61.8	62.1	62.3
1969	72.6	73.0	73.3	73.7	74.0	74.2
1970	39.3	39.5	39.7	39.9	40.1	40.2
1971	48.4	48.7	48.9	49.2	49.4	49.6
1972	58.7	59.1	59.4	59.6	59.9	60.1
1973	56.5	56.8	57.0	57.3	57.5	57.8
1974	49.1	49.4	49.6	49.9	50.1	50.3
1975	55.8	56.1	56.4	56.6	56.9	57.1
1976	63.3	63.6	64.0	64.2	64.5	64.7
1977	69.3	69.7	70.0	70.3	70.6	70.9
1978	54.7	55.0	55.3	55.5	55.7	55.9
1979	58.7	59.0	59.3	59.5	59.8	60.0
1980	66.2	66.6	66.9	67.2	67.5	67.7
1981	71.1	71.5	71.8	72.1	72.5	72.7
1982	64.4	64.7	65.0	65.3	65.6	65.9
TRC	$1,211.9M	$1,218.6M	$1,224.7M	$1,230.3M	$1,235.4M	$1,240.1M

APPENDIX I

RETIREMENT PROBABILITY LISTING

Annual Retirement Costs

(Baseline = 0)

Yr	-.03	-.02	-.01	0	+.01	+.02	+.03
1953	$ .2M	$ .2M	$ .2M	$ .2M	$ .2M	$ .3M	$ .3M
1954	.3	.3	.3	.3	.3	.3	.3
1955	3.0	3.1	3.2	3.3	3.4	3.4	3.5
1956	2.9	3.0	3.1	3.1	3.2	3.3	3.4
1957	4.6	4.8	4.9	5.0	5.2	5.3	5.4
1958	3.3	3.3	3.4	3.5	3.6	3.7	3.8
1959	11.4	11.9	12.3	12.7	13.1	13.5	13.9
1960	14.9	15.4	15.9	16.5	17.0	17.5	18.1
1961	15.0	15.7	16.5	17.2	18.0	18.7	19.5
1962	32.5	34.7	37.0	39.3	41.5	43.8	46.0
1963	28.7	30.6	32.6	34.5	36.5	38.4	40.3
1964	30.9	33.1	35.3	37.5	39.7	41.9	44.1
1965	34.2	36.5	38.9	41.3	43.6	46.0	48.3
1966	46.0	49.6	53.2	56.8	60.4	63.9	67.5
1967	43.1	46.0	48.9	51.7	54.6	57.5	60.4
1968	50.3	53.8	57.4	60.9	64.4	68.0	71.6
1969	59.4	63.8	68.2	72.6	76.9	81.3	86.7
1970	30.9	33.7	36.5	39.3	42.2	45.0	47.8
1971	40.2	43.0	45.7	48.4	51.2	53.9	56.6
1972	48.9	52.1	55.4	58.7	62.0	65.3	68.6
1973	45.8	49.4	52.9	56.5	60.0	63.6	67.1
1974	39.7	42.9	46.0	49.1	52.3	55.4	58.5
1975	45.2	48.7	52.3	55.8	59.4	62.9	66.5
1976	51.0	55.1	59.2	63.3	67.4	71.5	75.6
1977	55.7	60.2	64.8	69.3	73.8	78.4	82.9
1978	44.7	48.0	51.3	54.7	58.0	61.4	64.7
1979	48.4	51.8	55.2	58.7	62.1	65.5	68.9
1980	54.2	58.2	62.2	66.2	70.2	74.3	78.3
1981	58.3	62.6	66.8	71.1	75.4	79.6	83.9
1982	53.2	56.9	60.6	64.4	68.1	71.8	75.6
TRC	$996.8M	$1,068.5M	$1,140.2M	$1,211.9M	$1,283.6M	$1,355.5M	$1,427.0M

APPENDIX J

PERCENT OF BASE PAY LISTING

Annual Retirement Costs

(Baseline = 2.5%)

Yr	2.0%	2.125%	2.25%	2.375%	2.5%
1953	$ .2M	$ .2M	$ .2M	$ .2M	$ .2M
1954	.2	.2	.2	.3	.3
1955	2.6	2.8	2.9	3.1	3.3
1956	2.5	2.7	2.8	3.0	3.1
1957	4.0	4.3	4.5	4.8	5.0
1958	2.8	3.0	3.2	3.3	3.5
1959	10.2	10.8	11.4	12.1	12.7
1960	13.2	14.0	14.8	15.6	16.5
1961	13.8	14.6	15.5	16.4	17.2
1962	31.4	33.4	35.3	37.3	39.3
1963	27.6	29.3	31.1	32.8	34.5
1964	30.0	31.9	33.8	35.6	37.5
1965	33.0	35.1	37.1	39.2	41.3
1966	45.4	48.3	51.1	53.9	56.8
1967	41.4	44.0	46.6	49.1	51.7
1968	48.7	51.8	54.8	57.9	60.9
1969	58.1	61.7	65.3	69.0	72.6
1970	31.5	33.4	35.4	37.4	39.3
1971	38.7	41.2	43.6	46.0	48.4
1972	47.0	49.9	52.9	55.8	58.7
1973	45.2	48.0	50.8	53.6	56.5
1974	39.3	41.8	44.2	46.7	49.1
1975	44.7	47.4	50.2	53.0	55.8
1976	50.7	53.8	57.0	60.2	63.3
1977	55.5	58.9	67.4	65.9	69.3
1978	43.8	46.5	49.2	52.0	54.7
1979	46.9	49.9	52.8	55.7	58.7
1980	53.0	56.3	59.6	62.9	66.2
1981	56.9	60.4	64.0	67.6	71.1
1982	51.5	54.7	57.9	61.2	64.4
TRC	$969.7M	$1,030.3M	$1,090.9M	$1,151.4M	$1,211.9M

APPENDIX K

MAXIMUM PERCENT OF BASE PAY LISTING

Annual Retirement Costs

(Baseline = 75%)

Yr	50%	55%	60%	65%	70%	75%
1953	$ .2M	$ .2M	$ .2M	$ .2M	$ .2M	$ .2M
1954	.2	.2	.2	.2	.3	.3
1955	2.3	2.6	2.8	3.0	3.3	3.3
1956	2.2	2.4	2.7	2.9	3.1	3.1
1957	3.6	3.9	4.3	4.6	5.0	5.0
1958	2.5	2.8	3.0	3.3	3.5	3.5
1959	10.0	11.0	12.0	12.4	12.7	12.7
1960	12.9	14.2	15.5	16.1	16.4	16.5
1961	13.9	15.3	16.4	16.9	17.2	17.2
1962	33.5	36.4	38.1	38.8	39.2	39.3
1963	29.3	31.9	33.4	34.1	34.4	34.5
1964	32.1	43.9	36.5	37.1	37.5	37.5
1965	35.2	38.3	40.0	40.8	41.2	41.3
1966	49.1	53.4	55.5	56.3	56.7	56.8
1967	43.9	47.8	50.1	51.1	51.7	51.7
1968	52.0	56.7	59.2	60.2	60.9	60.9
1969	62.3	67.8	70.7	71.8	72.5	72.6
1970	34.8	37.7	38.8	39.1	39.3	39.3
1971	41.2	44.8	47.0	47.9	48.4	48.4
1972	49.9	54.3	56.9	58.0	58.7	58.7
1973	48.8	53.0	55.1	55.9	56.4	56.5
1974	42.6	46.3	48.0	48.7	49.1	49.1
1975	48.4	52.5	54.6	55.3	55.8	55.8
1976	55.0	59.7	62.0	62.8	63.3	63.3
1977	60.3	65.5	67.9	68.8	69.3	69.3
1978	47.1	51.2	53.3	54.2	54.7	54.7
1979	50.1	54.5	57.0	58.0	58.6	58.7
1980	56.9	61.9	64.5	65.6	66.2	66.2
1981	61.0	66.4	69.2	70.4	71.1	71.1
1982	54.9	59.8	62.5	63.6	64.3	64.4
TRC	$1,036.2M	$1,127.4M	$1,177.5M	$1,198.2M	$1,211.0M	$1,211.9M

APPENDIX L

MINIMUM LENGTH OF SERVICE LISTING

Annual Retirement Costs

(Baseline = 20 yrs)

Yr	20 Yrs	21 Yrs	22 Yrs	23 Yrs	24 Yrs	25 Yrs
1953	$ .2M	$ .2M	$ .2M	$ .2M	$ .2M	$ .2M
1954	.3	.3	.3	.3	.3	.3
1955	3.3	3.3	3.3	3.3	3.3	3.3
1956	3.1	3.1	3.1	3.2	3.1	3.1
1957	5.0	5.0	5.0	5.0	5.0	5.0
1958	3.5	3.5	3.5	3.5	3.5	24.9
1959	12.7	12.7	12.7	12.7	26.0	25.7
1960	16.5	16.5	16.5	31.5	31.1	30.8
1961	17.2	17.2	30.8	30.5	30.0	29.6
1962	39.3	39.3	40.0	39.7	39.1	38.7
1963	34.5	34.5	35.2	34.9	34.4	34.1
1964	37.5	37.5	38.3	37.9	37.4	36.9
1965	41.3	41.3	42.1	41.7	41.1	40.7
1966	56.8	56.8	58.1	57.5	56.5	55.8
1967	51.7	51.7	52.7	52.2	51.6	51.1
1968	60.9	60.9	62.1	61.6	60.7	60.0
1969	72.6	72.6	74.1	73.4	72.3	71.4
1970	39.3	39.3	40.4	39.9	39.1	38.4
1971	48.4	48.4	49.3	48.9	48.3	47.8
1972	58.7	58.7	59.8	59.3	58.5	58.0
1973	56.5	56.5	57.7	57.2	56.2	55.4
1974	49.1	49.1	50.3	49.8	48.9	48.2
1975	55.8	55.8	57.1	56.5	55.6	54.8
1976	63.3	63.3	64.8	64.1	63.0	62.1
1977	69.3	69.3	71.0	70.2	69.0	67.9
1978	54.7	54.7	55.9	55.3	54.5	53.8
1979	58.7	58.6	59.8	59.3	58.4	57.8
1980	66.2	66.2	67.6	67.0	66.0	65.1
1981	71.1	71.1	72.6	71.9	70.8	70.0
1982	64.4	64.4	65.6	65.1	64.1	63.5
TRC	$1,211.9M	$1,212.0M	$1,249.7M	$1,253.6M	$1,248.1M	$1,254.3M

APPENDIX L (Continued)

MINIMUM LENGTH OF SERVICE LISTING

Annual Retirement Costs

(Baseline = 20 Yrs)

Yr	26 Yrs	27 Yrs	28 Yrs	29 Yrs	30 Yrs
1953	$ .2M	$ .2M	$ .2M	$ .2M	$ 19.3M
1954	.3	.3	.3	16.6	16.1
1955	3.3	3.3	25.4	24.6	23.8
1956	3.2	20.7	20.1	19.5	18.8
1957	14.7	14.4	14.1	13.7	13.2
1958	25.3	24.6	24.0	23.2	22.4
1959	26.1	25.4	24.7	23.9	23.1
1960	31.2	30.4	29.6	28.6	27.7
1961	30.2	29.4	28.6	27.7	26.7
1962	39.3	38.3	37.3	36.1	34.9
1963	34.5	33.6	32.7	31.7	30.6
1964	37.6	36.6	35.6	34.4	33.3
1965	41.3	40.2	39.1	37.9	36.6
1966	56.9	55.4	53.8	52.1	50.4
1967	51.8	50.4	49.1	47.5	45.9
1968	61.0	59.4	57.8	55.9	54.1
1969	72.7	70.8	68.8	66.6	64.4
1970	39.6	38.4	37.3	36.1	34.8
1971	48.5	47.2	45.9	44.5	43.0
1972	58.8	57.2	55.7	53.9	52.1
1973	56.7	55.1	53.5	51.8	50.1
1974	49.3	47.9	46.6	45.1	43.6
1975	56.0	54.4	52.9	51.2	49.5
1976	63.5	61.8	60.0	58.1	56.1
1977	69.6	67.6	65.8	63.6	61.4
1978	54.8	53.3	51.9	50.2	48.5
1979	58.7	57.2	55.7	53.0	52.0
1980	66.4	64.6	62.8	60.8	58.8
1981	71.2	69.3	67.4	65.3	63.1
1982	64.4	62.8	61.1	59.1	57.1
TRC	$1,286.8M	$1,270.3M	$1,257.8M	$1,233.5M	$1,211.6M

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